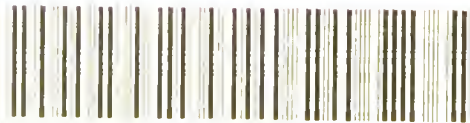


THE
CARDINAL SYMPTOMS
OF
URINARY DISEASE

E. HURRY FENWICK

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THE
CARDINAL SYMPTOMS OF URINARY
DISEASE.

By the same Author.



DIE VENEN DER VORDEREN RUMPFWAND DES
MENSCHEN. With Prof. W. BRAUNE. (Veit and Co., Leipzig.) 1884.

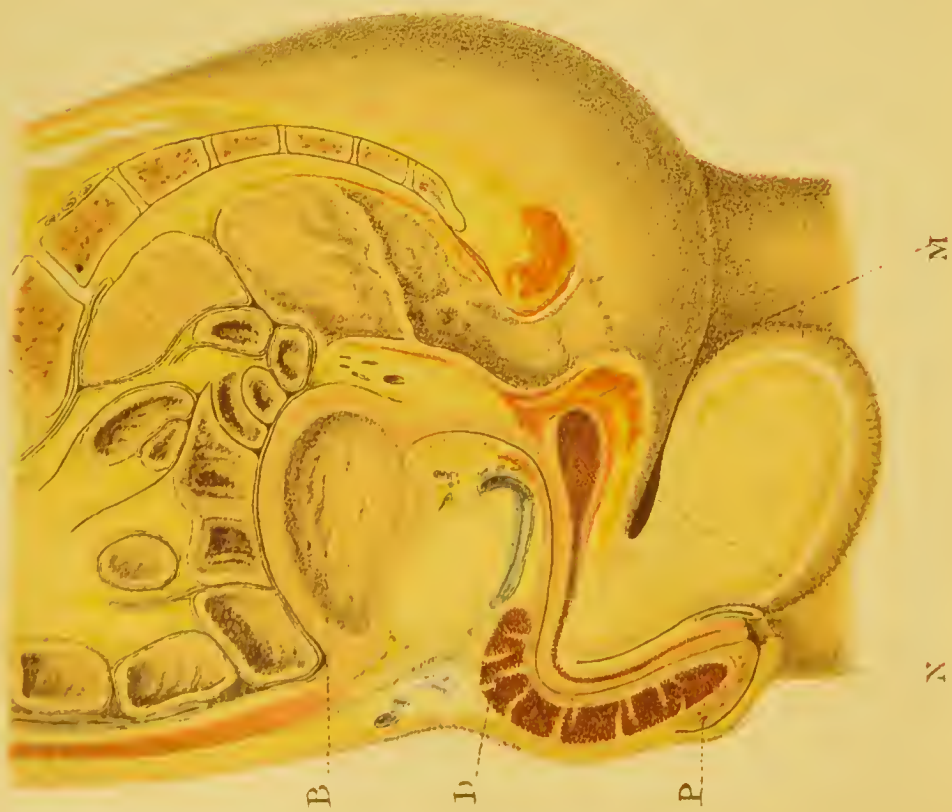
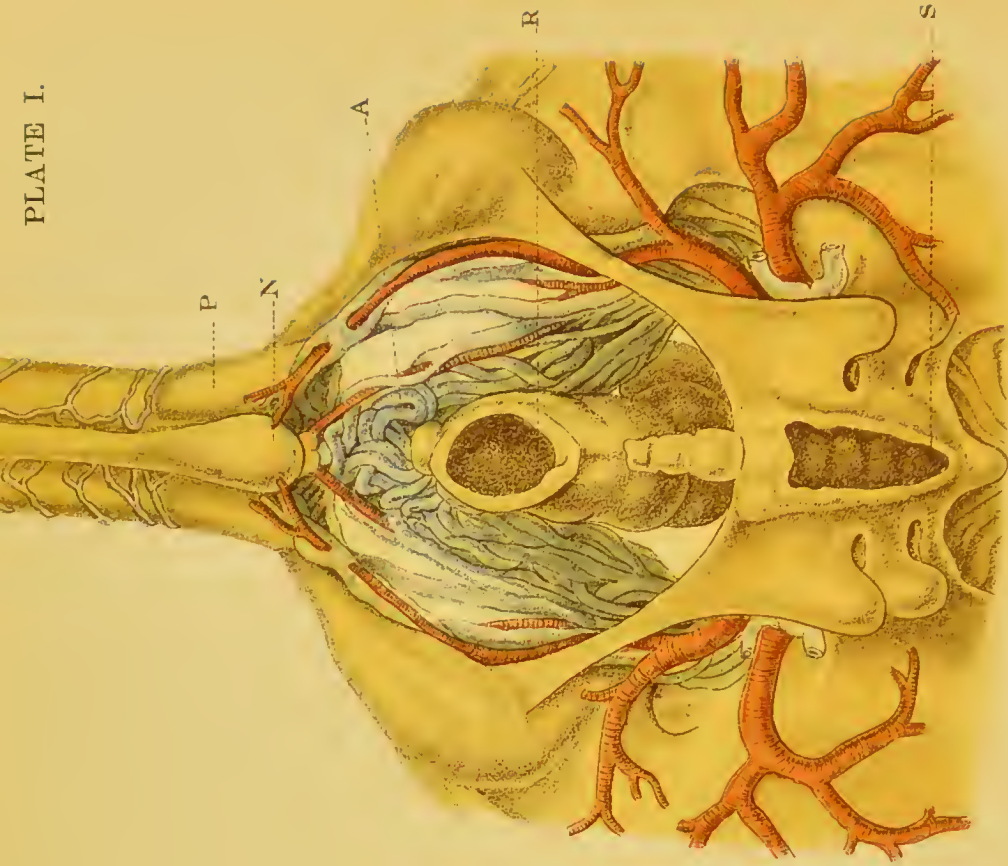
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and Co., Bristol.) 1892.





THE

CARDINAL SYMPTOMS OF URINARY DISEASE

BY

DIAGNOSIS, SIGNIFICANCE AND TREATMENT

BY

F. HUBBY GENTON, M.D., F.R.C.P.

LECTURER IN MEDICINE, ST. GEORGE'S HOSPITAL, LONDON

WITH THIRTY-SEVEN ILLUSTRATIONS

LONDON

J. & A. CHURCHILL

10, NEW BURLINGTON STREET

1897

THE
CARDINAL SYMPTOMS OF URINARY
DISEASE

THEIR
DIAGNOSTIC SIGNIFICANCE AND TREATMENT

BY
E. HURRY FENWICK, F.R.C.S.ENG.

SURGEON TO THE LONDON HOSPITAL; SURGEON TO ST. PETER'S HOSPITAL FOR STONE AND OTHER
URINARY DISEASES; LATE MEMBER OF THE CONJOINT EXAMINING BOARD IN
ENGLAND OF THE ROYAL COLLEGE OF PHYSICIANS AND SURGEONS

WITH THIRTY-SIX ILLUSTRATIONS

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PREFACE.

THE following pages comprise the substance of a series of lectures which were delivered in the new clinical theatre of the London Hospital during the Session of 1891-92. Three of these lectures were published (in abstract) in the 'Provincial Medical Journal;' all have been rewritten, and much new material, which was employed in illustrating subsequent demonstrations, has been added.

The lectures were based upon the histories of 2000 interesting cases which have come under my observation and care since 1879, the history in each instance having been taken by myself. Although I have thus endeavoured to guard against the fallacy of small numbers, and the inaccuracy which is inseparable from a mere collation of cases recorded in the literature, I am only too conscious of the deficiencies and shortcomings of the following pages.

I have given my opinions unreservedly, and when any statement ran counter to the accepted teaching of the present day, I have placed the reasons for my opposition either in the text or in the Appendix.

I gladly seize this opportunity of thanking most warmly my many professional friends who have sent me difficult cases, either for diagnosis or treatment; some of the latter are included in the hundred which I have selected to illustrate the subject.

E. HURRY FENWICK.

5, OLD BURLINGTON STREET;
January, 1893.

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ERRATA.

On page 65, Plate II *refers to* Case 25, page 65.

„ 67, Case 25 *is* Case 25A.

„ 103, Case 32 *is* 32A.

THE CARDINAL SYMPTOMS OF URINARY DISEASE.

INTRODUCTION.

GENTLEMEN,—I have had some little difficulty in choosing a subject which would furnish me with a continuous text for my share in the course of clinical lectures for this session. As I have, however, at present a large amount of urinary disease in my wards, and a still larger capital at St. Peter's Hospital upon which I can draw at any moment, I have selected the symptomatology of urinary disease to illustrate and to discuss with you. It is usual in clinical lectures to take a definite disease and to discourse upon its differential diagnosis, prognosis, and appropriate treatment. To exhibit to you the reverse of the medal, and to vary somewhat the monotony of a well-worn subject, I have grouped most of the urinary diseases under the four cardinal symptoms—hæmaturia, undue frequency of micturition, abnormal characters of the stream of urine, pain—and propose that we should first carefully consider each symptom by itself and ascertain its diagnostic significance before we attempt either the analysis or synthesis of any definite urinary disease. At first sight it would seem injudicious to lay such especial stress upon "single" symptoms, for such a course tends to foster superficial and hasty diagnosis; but I will furnish most of the lectures with practically complete tables, and these will serve to convince you of the danger of diagnosing from single symptoms. They will show you, however, the advantage of seizing upon some salient feature of the complaint as a clue or thread, which you can readily and quickly follow to a correct or at least a working diagnosis.

I am the more inclined to pay particular attention to prominent symptoms because the routine use of the cystoscope

has considerably widened my knowledge of their causes, and of these I was taught but little in my student days. Thus I learnt that pain at the end of the penis during, but especially after the act of micturition, denoted stone in the bladder, or perhaps an inflamed prostate. This was only a half-truth, and when I began practice I found, to my annoyance, that I could detect no stone on sounding in many of the non-prostatic cases of glans pain. I very naturally concluded that I had missed the calculus through lack of skill. On studying such cases, however, with the electric cystoscope I found many other reasons existing for this symptom. Thus, ulceration of a simple, catarrhal, or tubercular nature of the posterior wall of the bladder; acute localised cystitis; localised hæmorrhage; a long-pediced growth which engaged the urethral orifice in urination; enlargement of the median lobe of the prostate; tubercular deposit of the prostate; and swelling of the verumontanum, were among the causes which I found evoked the glans pain. In women, metritis, parametritis, and even ovaritis affects by contiguity an otherwise healthy bladder, and induces pain on micturition at the urinary outlet.

That which is true of this one symptom is true of all. No intervention has been so powerful in ripening our knowledge, or has given us a deeper or truer insight into the true symptomatology of obscure urinary disease, than the Nitze method of illuminating the bladder with electric light. It has, moreover, permitted us to criticise and correct old-established axioms and procedures, and to adopt new and more reliable rules. By saying this, I do not wish you to gather that it is indispensable for you to use it. Such is not the object of these lectures. The electric cystoscope is unsuited for the requirements of the general practitioner, it demands more time, patience, and practice than he is able to give. It is costly, and necessitates some knowledge of electrical technique. I wish to make you *independent* of the cystoscope by placing before you that increment of knowledge which it has already added to the general fund.

SECTION I.

HÆMATURIA.

I HAVE chosen hæmaturia, or the presence of blood in the urine, as our first subject because there are few symptoms which are so difficult to trace to an exact site and cause, few which prove so alarming to the patient, and fewer still which baffle so easily the therapeutic resources of the practitioner when once the tendency to urinary hæmorrhage has become established.

To treat hæmaturia scientifically and successfully we must first ascertain the source and cause of the hæmorrhage.

THE SOURCE OF HÆMATURIA.

Up to the date of the introduction of electric illumination of the bladder, all our experience of the obscure diseases of the urinary tract was obtained slowly and with difficulty, for it was acquired either by post-mortem or by operative interference.* Thus in many instances of early hæmaturia, with the exception of stone, we could not do more than surmise the source of the bleeding. The cystoscope of to-day has, however, changed all this, for it enables the surgeon in a very large number of cases of obscure hæmaturia to ascertain the source and cause of the hæmorrhage.

The not infrequent difficulty of diagnosing the source without the electric cystoscope will perhaps be better appreciated by a glance at the following table of cases :

* Sir Henry Thompson (Lectures, 1884, p. 32), after advocating digital exploration of the bladder in obscure cases, says, " Indeed, it is difficult to say what may not be found, as fresh experiences have brought to light conditions to some extent not hitherto recognised. Hence there are few occasions, I confess, which for me have excited a more lively interest than the moment at which my finger enters a bladder, the condition of which has been a theme of keen inquiry and speculation for some months or even for years before."

Initial.	Consultant.	Diagnosis given to or sent with patient.	Cystoscopy.
G.	Hospital Surgeon	Ulcer of bladder	Ulcer of bladder
M.	Ditto	?	Ditto
E.	Ditto	?	Localised hæmorrhagic cystitis
R.	Ditto	?	Ulcer of bladder
D.	Hospital Surgeons {	Growth of bladder; malingering; ulceration of bladder	{ Ditto
G.	Hospital Physician	Malingering	Growth of bladder
C.	Hospital Surgeon	Villous of bladder	Cancer of kidney (subsequent P.M.)
B.	Ditto	Declined	Renal
W.	Ditto	Prostate	Encysted stone
W.	Ditto	?	Tuberculosis
W.	Ditto	Villous of bladder	Left renal carcinoma
B.	Ditto	Villous of bladder	Carcinomatous kidney
T.	Ditto	Prostate	Ulcer of bladder
T.	Ditto	?	Ulcer of bladder
S.	Hospital Physician	?	Renal
H.	Ditto	Renal stone	Vesical growth
F.	Hospital Surgeon	?	Cystitis
P.	Ditto	Bladder	Renal
C.	Ditto	Prostate	Growth of bladder
E.	Ditto	No bladder growth; renal	Bladder growth

The reason why I have selected these particular twenty from a hundred other cases of profuse hæmaturia is because in each instance a hospital surgeon or physician had been consulted prior to the patient coming under my care. I have chosen this professional grade so that you should have no doubt as to the skill and knowledge of the consultant. In the third column stands the diagnosis given to the patient or sent to me with the case. In the fourth column is placed the diagnosis made by means of the electric cystoscope, and verified in most cases by the progress of the case, operation, or post-mortem. You notice at once how that in some instances the opinion was uncertain (signified by ?), and that when a provisional diagnosis was made it was often inaccurate.

You must not, however, take this list as a sample of what you will meet with in practice. You certainly will have difficulty in accurately diagnosing the source of hæmaturia without the aid of the cystoscope, but not so much as this list would lead you to suppose; all of these were consultation cases, and therefore of unusual obscurity. Nor should I like

to convey to you an impression that I have myself been able to diagnose such cases without the electric cystoscope. Far otherwise; when the Nitze method came into vogue* I diligently sought out many of my old cases of hæmaturia, and placed the diagnosis I had labelled each with by the side of that which I was able to make with the electric light. I do not remember a more humiliating, nor perhaps a more useful lesson. I shall refer to it when we consider the causes of hæmaturia.

RULES FOR THE DIAGNOSIS OF THE SOURCE.

To lessen the difficulty of diagnosing the source of the hæmorrhage certain rules, which you will find in most text-books, have been framed for the guidance of the practitioner. They are based for the most part (A) on the colour of the urine, (B) upon the time at which the blood appeared in the stream, and (C) upon the shape of the clot. I shall review these rules, demonstrate their fallacies, and advise you which to reject and which to remember.

(A) *The Colour of the Urine.*

Rule 1.—"The brighter and more arterial the colour of the urine, the nearer the source of the bleeding is to the meatus."

This is correct to a great extent, but you must remember that in severe injuries to the kidney and in some cases of renal carcinoma in the adult and sarcoma in the child† the blood is poured out so rapidly, and enters the bladder in such large quantities, that it is expelled therefrom almost as bright in colour as when it issued from the rupture or from the vascular growth. Here is a striking example:

CASE 1.—A year ago this man, æt. 53, passed in front of me the brightest of scarlet urine. He complained of neither frequency nor pain, but stated that he was subject to similar and intermittent bleedings. I diagnosed a vesical growth, and proceeded to verify it with the cystoscope. The bladder was, however, absolutely healthy, but the lips of the right ureteral orifice were stained with blood. Thereupon—and I ought to have done this at first—I examined the kidney, and found it the size of a foetal head and obviously carcinomatous. The tumour is now much larger, and extends almost to the umbilicus, but the hæmorrhage has ceased.

CASE 2.—I removed this right kidney three months after the onset of a profuse hæmaturia. The patient was sent to me by Mr. Hall. I determined

* Author, "The Electric Illumination of the Male Bladder by means of the New Incandescent-Lamp Cystoscope," 'Brit. Med. Journal,' Feb. 4th, 1888.

† Also in severe injuries to the kidney.

on this course because I saw almost arterial blood pour from the right ureter. You will see that the cause of the bleeding is from a monkey-nut-sized growth which has fungated into the pelvis of the kidney, and the section demonstrates this button to be the apex of a carcinomatous infiltration which occupies the middle of the anterior half of the gland, but which does not approach the surface. It was quite unrecognisable and unfeeleable before removal. I regret to say the patient died three days after, apparently of shock.

The third, and very instructive case, to which I shall allude, occurred in Talbot Ward, under my colleague, Mr. McCarthy, in April, 1889.

CASE 3.—G. W—, æt. 44. Twelve months previous to coming under observation the patient, being in perfect urinary health, was lifting a moderate-sized weight when he felt something snap in his left side. He passed a large quantity of liquid blood. The hæmorrhage was arrested by a week's medicine and bed. It recurred upon his going back to work, and large clots came away with the urine. Since this recurrence the character of the attacks has always been the same. The hæmorrhage is profuse—in some instances alarmingly so, but rest in bed checks it. On resuming his occupation the blood returns with great violence. No pain and no frequency are complained of. The day I examined him the hæmorrhage had completely ceased.

Cystoscopy.—Bladder healthy throughout. Left ureteral orifice is marked by a red blush, the lips are pouting; right ureteral opening healthy. Prostate small. No renal tumour. Diagnosis, probably left renal carcinoma.*

This occurred in the early days of electric cystoscopy, and as my incomplete diagnosis was unsatisfying to one of my colleagues, I had the patient watched. He became "blind" for four days in Seabrook Ward, Hemel Hempstead Infirmary, from excessive loss of blood, and finally drifted into the Infirmary in St. George's in the East, under Dr. Harris, where he died.

Dr. Elwin Harris, to whom I applied for a record of the autopsy, very kindly wrote me a letter about the patient (dated October 13th, 1891), in which he says, "George W— was a case of profuse hæmaturia, which I erroneously diagnosed as malignant disease of bladder. I well recollect my surprise at finding the bladder quite free from disease at the post-mortem. . . . I signed the certificate 'Carcinoma of kidney.'"

Rule 2.—"The darker and more diffused the blood is, the more likely it is to emanate from a renal source."

This you must reject absolutely. The dark colour depends upon the action of the urine upon the hæmoglobin of the blood. Now the dark colour is noticeable whenever the blood has remained long in contact with acid urine; and perhaps the best example of "black bloody urine" is to be found in cases of profuse hæmorrhage into the bladder accompanied by retention from clotting. It varies under

* This case up to this point is excerpted from 'Electric Illumination,' ed. 2, p. 195; and my reason for recording a case twice is that since it was published (1889) I have been able to obtain a record of the post-mortem (Oct., 1891).

these conditions from the colour of porter to a jet-black. As a case in point—

CASE 4.—Here is a young fellow, æt. 20, upon whom you saw me perform perineal cystotomy two weeks ago for profuse hæmorrhage into the bladder. The bladder was filled with clotted blood and urine, and stood out as a firm well-defined tumour in the supra-pubic region, reaching almost to the umbilicus. The largest catheter we could pass got so completely plugged with clot, and the distress of the patient was so great, that I decided to open the bladder and evacuate the clots. Even with the perineal incision I was unable to clear away the massy clots which had formed in the bladder, and had to resort to suction with a powerful exhausting syringe before I could empty the viscus of thirty ounces of almost black clot and much urine. The bleeding had emanated three days previously from a prostate enlarged by masturbation, but the primary cause of the hæmorrhage was due to rough and reckless instrumentation.

When we discuss the treatment of such cases you will find the procedure adopted in this case is very rarely needed in *acute* hæmorrhage. This is the first time I have been forced to perform it for such a condition, though for persistent and exhausting bladder hæmorrhage it is most suitable (cf. Section IV).

Again, for a similar reason, in hæmorrhage into the bladder in any form of atony (such as that induced by stricture or prostatic enlargement) the urine must assume a dark colour, for it remains for some time in contact with the residual urine left in the viscus by inefficient expulsion.

CASE 5.—This porter-coloured specimen is passed by this patient, H—, æt. 60, who was in Mellish Ward not long ago. He asserts that he will pass clear urine for four or five times, and then the sixth time the urine will be as dark as this specimen. These attacks happen every three or four days. The cause of the bleeding is not renal; it is vesical. The cystoscope shows an enlarged prostate projecting into the bladder, and a deep ulceration, which I have already demonstrated to some of you, upon one of the salient lobes. The bladder is atonic, and he uses a catheter. There is much residual urine, so that the blood becomes mixed with stale secretion, and is acted upon by it. The last time I examined him the breach in the surface was plugged with clot, and the bleeding had ceased for a day or two. Directly that loosens, which it probably will by shrinkage, and is thrust out of its hole by any extra walking or jolting, the blood will reappear in the urine.

Lastly, in certain cases, although there is no residual urine, yet the blood leaks from an abraded surface so slowly that it becomes mixed with a large amount of the healthy secretion. It is therefore voided merely “smoky.”

In the medical wards you are taught that smoky or beef-tea looking urine is always renal. It very often is, but if you regard this aspect as an infallible test, and do not examine

for the albumen which accompanies renal hæmaturia, you will be often mistaken.

Perhaps the best case I can allude to as an example is that of Mrs. W— (Case 6), from whom I recently removed a small Tangerine-sized vesical growth. Her urine had misled her practitioner into a diagnosis of renal hæmaturia, because it varied from a light coffee-colour to a beef-tea. This condition was merely due to the very slight bleeding of a villous growth mixing in a capacious bladder with a large quantity of healthy urine.

For these reasons I should dissuade you from placing too much reliance upon the aspect of the urine when you attempt to judge the source of the hæmorrhage, and would advise you to be guided rather by the indications of the locality which co-existing symptoms usually convey, and by a careful microscopic and chemical examination of the urine, to both of which investigations I shall refer presently.* In being influenced by co-existing symptoms do not allow yourself to be misled by the pain and straining which are often induced by clot retention or clot impaction.

(B) *The Time at which the Blood appears in the Stream.*

(a) *At the end of the stream.*—Rule 1.—“Blood appearing towards or at the finish of clear urination denotes a vesical or a prostatic origin.” This is a rule you may safely rely upon. The cause of its production is obvious. The vesical muscles form contractile planes which are situated between two vascular surfaces, an external subperitoneal layer and an internal mucous membrane. The external subperitoneal venous nets which empty themselves into the internal iliac veins, receive the blood from the internal mucous membrane mesh, by means of vessels piercing the muscle planes. When the muscle planes contract, the external venous nets empty themselves, and are prevented refilling by regurgitation by means of valves;† but the internal meshes become more turgidly congested as the contraction increases, for their efflux trunks are compressed by the muscles through which they pass on their way to join the external nets. The vessels underlying or abutting on any breach of surface such as an ulceration, or any thin-walled vessels such as those which form the basis of the structure of villous growths, will therefore have dangerous

* Vide p. 14.

† Author, “Venous System of Bladder,” ‘Journal of Anatomy and Physiology,’ 1885, p. 320.

venous pressure placed upon them on contraction of the bladder. If to the force of an ordinary expulsive effort is added the extra stress of straining, the rupture of a congested, weakened, or thin-walled surface mesh is easily produced, and a little blood is expelled after or towards the end of the vesical act. I will not weary you with examples of this. The best I have shown you occurred in the case of *Bilharzia hæmatobia*, in which the ova came with a few drops of blood at the end of a clear stream of urine, and in which the cystoscope revealed multiple punctiform hæmorrhages at the base of the bladder.

Rule 2.—"Blood appearing at the commencement of micturition is indicative of a prostatic origin." It is often true, I will admit. Here is a case in point.

CASE 7.—This patient of sixty years of age passes blood on an average thrice a week, the blood appearing at the commencement of urination. With the cystoscope I have demonstrated a median lobe, the size of a monkey-nut, which is obstructing the outlets of the bladder. Its anterior surface is eroded, and bleeds on the slightest touch. The blood trickles into the urethra, and is swept away first in the stream of urine.

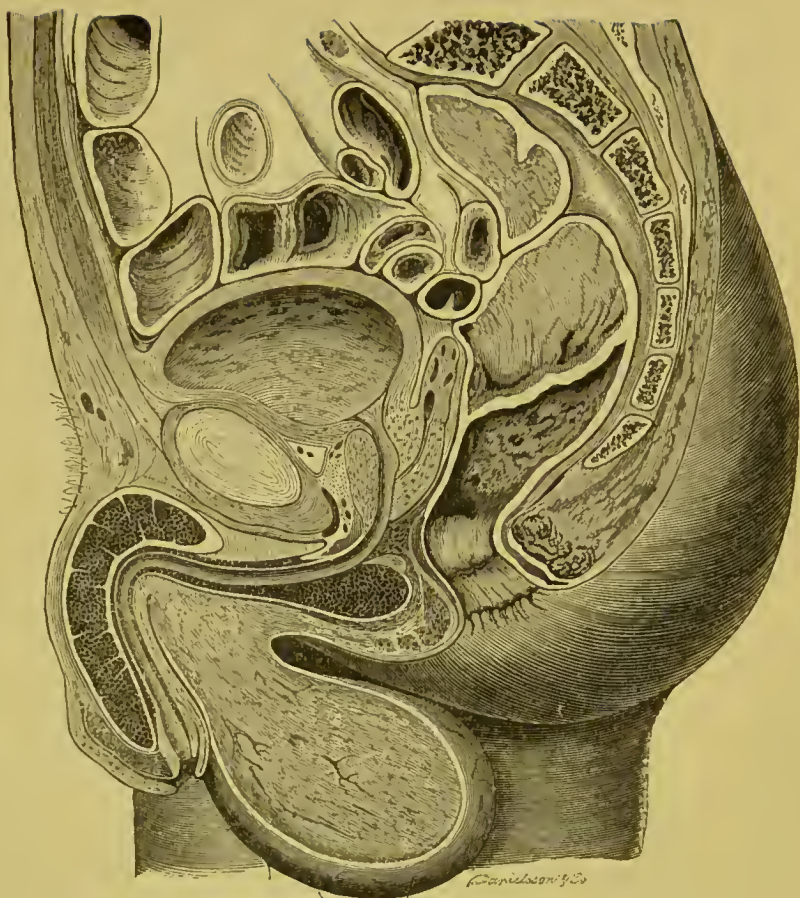
I should prefer you to modify this rule, however, by changing it thus—"fluid blood appearing at the commencement of the stream is usually prostatic;" for should a vesical clot settle to the opening of the urethra (the most dependent part of the bladder, as you will see by this picture of a frozen section, made by my late friend and colleague Prof. Braune of Leipzig, Fig. 1), the clot will be shot out with the first rush of urine, and its early appearance in the stream will mislead you.

Rule 3.—"Blood issuing from the urethra between the times of micturition denotes a bleeding of urethral origin." This is self-evident and reliable. But be sure that the blood is issuing from the *meatus*.

The following (*Case 8*) tells its own tale of a need for meatal examination in patients with tight foreskins.

CASE 8.—A patient, a waiter, was brought to St. Peter's Hospital with a diagnosis of severe urethral hæmorrhage. He was blanched, and faint from continued and profuse loss of blood. My colleague, Mr. Swinford Edwards, ascertained that the patient felt something give way as he was carrying a heavy tray upstairs, and thereupon he found blood running freely down his legs. The usual remedies, I believe, had been tried, but without success, and as the man's condition became alarming he was sent to the hospital. On turning the tight prepuce back to examine the meatus, a venereal ulceration became visible, and in it a pumping artery which had become involved in the sloughing action. A catgut ligature was applied, and the case ceased to be dangerous or difficult.

FIG. 1.

(c) *The Shape of the Clot.*

Much information can be derived by floating in water the clots passed by the patient.

Rule 1.—"Long thin clots like earthworms or quill-barrels, shorter and thinner clots like red fishing-worms, are almost certain to indicate bleeding from the renal pelvis, for they are casts or moulds of the ureter." *

Not long ago, in dealing with a case of profuse renal hæmaturia, I demonstrated to you the cause for the abrupt cessation of the hæmorrhage. On introducing the cystoscope, and turning it over to examine the right ureteral opening, there could be seen a dark grey clot partially extruded from that orifice, and twisted like the arm of a tiny octopus. This

* Cf. Hilton, 'Guy's Hospital Reports,' vol. xiii, 1867, p. 24.

plug was the obvious cause for the sudden disappearance of blood from the urine, for the ureter was temporarily occluded by it.

It had been noted that the reappearance of every attack of hæmorrhage was heralded by the appearance of a long cylindrical black or greyish clot. To make the chain of evidence complete I introduced a suction catheter and removed the clot, whereupon a stream of scarlet blood was seen jetting out of the uncorked orifice. The clot was like a lugworm (Case 2, p. 5).

The thick, long clots of urethral formation usually follow upon traumatism of that canal. They can hardly be mistaken for ureteral clots. They are swept away before the stream of urine.

But the clots are sometimes smaller and thinner, like thin red fishing-worms, and these I regard as almost certain indications of hæmorrhage into the pelvis of the kidney.

CASE 9.—A patient was here exhibited who had suffered for a month from hæmaturia and persistent erection of the penis from malignant growth of the corpora cavernosa. The urine contained red fishing-worm clots, and opinions differed as to their origin. The obvious mass of cancer in the perinæum and penis, coupled with the history of a blow in the crutch, pointed to the urethral canal as being the most likely source. The entire absence of any renal tumour strengthened this view. The lecturer's belief of their renal origin was, however, confirmed by subsequent events. At the operation of perinæal cystotomy, which was performed soon after the lecture was given, these clots were removed with the urine from the bladder, they had therefore emanated from some site above the urethra, probably the ureter. On post-mortem, carcinoma of the right kidney was discovered.*

Rule 2.—"Large, irregular-edged, eroded clots are usually derived from a bladder source." Dr. Dickinson† asserts that the presence of considerable clots is nearly conclusive against renal hæmorrhage. This is not quite correct. The patient before you (Case 1) with the huge renal tumour has passed such enormous clots that you would hardly credit that the urethral canal could permit of their passage. This is not an uncommon case. In severe hæmorrhage from renal carcinoma or rupture of the kidney, or even in granular kidney, the clots which may become moulded in the bladder are often enormous.

* 'Path. Trans.,' vol. xliii, 1892, p. 9.

† Dickinson, 'On Renal and Urinary Affections,' iii, 1276.

COMMENTS UPON ADDITIONAL AIDS TO DIAGNOSIS OF SOURCE.

Ultzmann's Fibrinuria.

Ultzmann* has called attention to a condition of urine which he has called fibrinuria, and which he considered an important diagnostic feature in villous growths of the bladder. The urine on being passed is of a reddish-yellow colour; it coagulates almost immediately into a jelly-like mass. Such urine does not contain much blood, as shown by its colour; hence the coagulum is not in proportion to the quantity of blood present in the urine.

Ultzmann's theory of the production of fibrinuria is that the spasmodic contraction of the bladder checks the blood returning from the villi, and the vascular loops therefore become extremely turgid. If the blood-pressure is very great the vessels rupture, and hæmorrhage ensues; if the tension is not sufficient to cause rupture of the vessels a transudation of plasma occurs, whose fibrin coagulates on the emission of the urine. This increased vascular tension also accounts for the presence of more albumen in the urine than would correspond to the quantity of blood and pus present.

Ultzmann gives three cases in which he had observed this symptom. I must ask you to remember this symptom, but to consider it as *the very rarest* of those evoked by vesical growth, and of no importance whatever in enabling you to decide upon the *character* of the growth. For my own part, though my personal experience amounts to a hundred cases of vesical growth, I have not met with it once. Willist† probably encountered a case of this nature.

"Tapping" the Ureters.‡

Sir Henry Thompson§ advises, "when it is essential to obtain a pure specimen of the renal secretion free from the presence of vesical products, to pass a soft, flexible catheter

* Ultzmann, 'Ueber Hämaturie,' p. 134.

† Willis, 'Urinary Diseases and their Treatment,' p. 169, 1838. "The urine gelatinised in the utensil, and when viewed by transmitted light was of a pale red currant jelly colour."

‡ I have discarded my instrument, the ureter aspirator ('Lancet,' Sept. 18th, 1886, p. 29), since the introduction of the Nitze method.

§ Sir H. Thompson, 'Diseases of the Urinary Organs,' 1888, p. 452.

of medium size into the bladder, the patient standing, to draw off all the urine carefully, and to wash out the viscus by repeated small injections of warm water, and then to permit the urine to pass, as it will do, *guttatim*, into a test-tube or other small glass vessel for purposes of examination. The bladder ceases for a time to be a reservoir; it does not expand, but is contracted round the catheter, and the urine percolates from the ureters direct. The ureters are virtually lengthened as far as the glass. Thus is obtained a specimen which, for appreciating albumen, for determining reaction, and for freedom from vesical pus and even blood, and from cell-growths of vesical origin, is of considerable value, and has sometimes furnished me with the only data previously wanting to accomplish an exact diagnosis."

The cystoscope has in my own work obviated the necessity of this valuable manœuvre, but I give you the extract as you will find this expedient of value. Be careful, however, to employ only aseptic fluids and aseptic catheters; use boiled water or boracic solution (4 per cent.), for in cases of vesical tumour you are liable to set up cystitis, which, if the growth is of the malignant type, will assuredly hasten your patient's end by supplying an increased pabulum of blood to the disease. In tuberculosis nothing is more deadly or more culpable than the introduction of septic material into the bladder, by septic catheterism and septic washing. Inflammation, which perhaps before was sluggish and localised to the bladder, will under these circumstances flare up, traverse the entire length of the ureters, and implicate the renal pelves beyond repair in twenty-four hours.

On the Subsidence of the Blood in a Conical Glass.

Jaksch asserts that "when blood-cells are intimately mixed with the urine in such a way that, though present in large quantity and deeply tingeing the fluid, they do *not* form a sediment after many hours' standing, it may be inferred that the hæmorrhage took place in the substance of the kidney or in the renal pelvis or ureters. If under these circumstances, they are seen with the microscope to be profoundly altered, having lost their colouring matter, and presenting the appearance of pale yellow rings, the further conclusion results that the blood was effused in the kidney itself, and the

symptom points to acute nephritis, or to a fresh exacerbation in the course of chronic nephritis.”*

Newman has shown that the relationship between the quantity of hæmoglobin and the amount of albumen in the urine aids greatly in determining the seat of the hæmorrhage.†

The Passage of Fragments of Growth.

It is not an uncommon event (19·3 per cent.)‡ for the patient to pass visible pieces of growth; as this is only known§ to have occurred in vesical neoplasms, it follows that the locality is at once indicated. I have met with them from scraps varying from a pea in size to a slough half the length of the little finger. The latter mass was passed by a patient under Dr. Heslop.

Microscopy.

The presence of blood-casts gives an accurate clue to the origin of the hæmorrhage. I have met with one case of severe paraffin burn of the whole body in which the patient passed an ounce of perfect blood-cylinders in eight ounces of secretion. The cylinders fell at once to the bottom of the conical glass, and presented a very curious appearance. Death took place in a few hours. The kidneys were turgid with blood, and in the first stage of nephritis.

The eggs of the *Bilharzia hæmatobia* usually point to the hæmorrhage being from the bladder.

* Translation of Jaksch's 'Klinische Diagnostik innerer Krankheiten,' 2nd ed., transl. by Caygney, p. 175.

† 'Lectures to Practitioners on Surgical Diseases of the Kidney,' p. 81; *vide* Appendix B.

‡ Apparently visible growth is passed in benign cases more often than in malignant—*i.e.* 33·9 per cent. of the former as against 17·2 per cent. of the latter.

§ The following case recorded by my colleague, Mr. Harrison, is an exception. "Serious renal hæmaturia occurred in a case of villous tumour of the bladder, about which there could be no doubt, as a portion of the growth which was passed was submitted to microscopical examination. It was proposed to open the bladder for the purpose of exploring and, if possible, removing the tumour. This, however, was not done. After death the pelvis of one of the kidneys was found filled with a similar growth. The use of the microscope must not be omitted in doubtful cases of renal hæmaturia, as valuable information may thus be afforded."—'Surgical Disorders, Urinary Organs,' p. 239.

SECTION II.

THE CAUSES OF HÆMATURIA—THE HÆMATURIA OF DIRECT VIOLENCE, OF DRUG OR DIET, OF DISEASE. THE DIAGNOSTIC SIGNIFICANCE OF SLIGHT TRAUMATISM IN THE PRODUCTION OF HÆMATURIA—SYMPTOMLESS HÆMATURIA—DIFFERENTIAL DIAGNOSIS.

THE CAUSES OF HÆMATURIA.

BUT if difficulty was encountered in fixing upon the *source* of early hæmaturia, much greater was the perplexity in estimating the *causes* which had evoked the hæmorrhage. More especially was this the case in that class which may be called "symptomless" hæmaturia.

After obtaining some experience with the electric cystoscope, I got together some of my obscure cases of hæmaturia—cases over which I had spent much time, of which I had taken careful notes, and on each of which I had pronounced a definite opinion. To my chagrin I found that my diagnosis had often fallen wide of the mark. Here is a list of ten.

Initial.	Pre-cystoscopic opinion.	Cystoscopic diagnosis.
Th.	Villous	Localised cystitis
B.	"	Renal carcinoma
Cl.	Vesical growth	Localised cystitis (hæmorrhagic)
S.	Villous	Renal
G.	Vesical bleeding	Renal
D.	Growth of bladder	Tuberculosis
G.	Prostatitis	Encysted stone
K.	Villous over right ureteral orifice	Localised cystitis
B.	Prostatic	Ulceration
O'N.	Stone "somewhere"	Tubercle

This is certainly a humiliating table, and I could, I am sure, increase its numbers if I could have traced more of my patients. My keen sense of failure was not much lessened

by finding my professional brethren equally at fault as myself, although many cases with their diagnoses drifted into my hands, and I was able by means of the cystoscope to compare facts with the erroneous hypotheses of others.

Foreseeing that the cystoscope could not generally be used, I commenced to make careful notes of the symptoms of each patient before making an examination. I have used these and other more or less obvious cases* in framing certain diagnostic rules which may be of use to you. Though they are somewhat rough and ready, they are in the main reliable.

The diagnosis of hæmaturia may be considered under three divisions: the hæmaturia of injury; of diet or drug; of disease.

To discuss hæmaturia due to direct violence is unnecessary; the site of the injury usually locates the position and cause of the hæmorrhage. The treatment of such cases will be alluded to later on—Section IV.

THE HÆMATURIA OF DIET OR DRUG.

(a) *Diet*.—Certain articles of diet are known to produce hæmaturia if indulged in too freely, or if taken by persons of gouty habit, or by those who have a special idiosyncrasy. Thus the common or garden rhubarb† may produce a sharp attack of hæmaturia, with frequent and painful micturition, more or less pain in the loins, and general indisposition. Hard drinking water—supplying the lime for the oxalic acid of the rhubarb to combine with and form oxalate of lime—is suggested by Dr. O'Neill as being a necessary factor.

Other fruits, such as the gooseberry, unripe apple, drink made of sorrel, and certain species of strawberries, are credited with the same powers.

Although asparagus is known as a diuretic,‡ it is not, I believe, generally supposed to induce hæmaturia. My col-

* These cases include an experience of 100 cases of vesical growth, 10 of renal carcinoma, 15 of prostatic malignant growth, 100 cases of urinary tuberculosis, and the ordinary routine of stone, stricture, and enlarged prostate. Many of the diagnoses of the more obscure cases have been verified by time, autopsy, or operative procedure.

† Prout, 'Stomach and Urinary Diseases,' 1840, p. 24; Medicus, 'Lancet,' June 28th, 1890, p. 1457, "Hæmaturia and Garden Rhubarb." Compare Dr. Wm. O'Neill, "Hæmaturia and Garden Rhubarb;" also M.D.; also T. Charters White, 'Lancet,' 1890, July 5th, p. 54; Francis Boyd, "Oxaluria and Hæmaturia," 'Lancet,' Oct. 24th, 1891, p. 927.

‡ 'Lancet,' June 13th, 1891, p. 1337.

league Mr. Reginald Harrison* has mentioned that this latter symptom has occurred in his practice.

Whilst remembering these facts, you must not permit yourself to be satisfied with the diagnosis of rhubarb hæmaturia unless the symptoms rapidly subside on the vegetable being discontinued.

CASE 10.—The patient who is now in No. 2, Cotton Ward, came to me complaining of hæmaturia, and suggested it was due to the inordinate amount of spring rhubarb he had been eating. The symptoms, however, were found to have lasted for some years, and to have been only aggravated every spring in the rhubarb season. I sounded him, detected calculus, and removed this large stone suprapubically. The stone is covered with large glass-like crystals.

Other vegetables and some fruits† colour the urine like blood, but there is deficient evidence as to whether they actually cause bleeding.

(b) *Drugs.*‡—Cantharides and turpentine are the two chief drugs which excite hæmaturia. They cause so much renal or vesical congestion as to produce the escape of blood. Cantharides, being a constituent of certain quack aphrodisiac medicines, is not an uncommon evoker of hæmaturia. "Spanish fly" blisters produce similar results in patients who are sensitive to the use of cantharides. Turpentine is a very favourite remedy amongst the working class for colds, pains in the back, and urinary troubles. Sometimes the remedy is credited with the bleeding which is in reality caused by the disease.

CASE 11.—The young fellow sent by Mr. Howse and now in Talbot Ward, from whom I removed by litholapaxy this date-stone-sized oxalate of lime calculus, had taken turpentine to relieve pain in the back. The onset of

* Harrison, 'Med. Press and Circ.,' p. 651, June 26th, 1890.

† *Beetroot*.—"Desault relates the case of one who noted his morning urine was of a bright blood-red colour. He consulted M. Roux. It was found he ate red beetroot every night for supper." Logwood and *madder* have the same effect. The *prickly pear* (*Cactus opuntia*):—"When the Spaniards first took America many of them were alarmed by observing that they were passing what they supposed was bloody urine. It proved to be due to the liberal use of the prickly pear." Dr. Hennen ('Military Surgery') quotes from 'Elliot's Journal of his Travels for determining the Boundary of the United States': "People ate very plentifully of this substance (prickly pear) at an island of the Mississippi (Kayoani), and were not a little surprised the next morning at finding their urine appear as if it had been highly tinged with cochineal. No inconvenience followed." (Sir Thomas Watson, 'Lectures on the Practice of Physic,' vol. ii, 718, 1843.)

‡ "*Rhubarb* and *senna* in alkaline urine impart a red coloration to the urine. It is removed by adding acid, and returns on overcoming the acid with alkali."

the hæmaturia and strangury was so sudden and the attack so transient that at first I thought it might be due to turpentine poisoning.

Turpentine hæmaturia may not be accompanied by vesical irritability, but it usually is.*

THE HÆMATURIA OF DISEASE.

The appearance of blood in the urine in the course of some malignant fevers, measles, smallpox, typhus, or the hæmaturia after cholera† (Prout), does not come within the scope of this lecture. The various causes of hæmaturia which we have to investigate clinically are for the most part "surgical." To facilitate our work we may form two classes, into one or other of which all our patients may be placed:—(1) Hæmaturia without co-existing symptoms—symptomless hæmaturia. (2) Hæmaturia with symptoms. In both classes, but especially in the symptomless variety, you will find that much information may be gained by skilfully cross-examining the patient as to the character of the onset. It is comparatively easy to obtain accurate details of the first appearance of *blood*, for the patient is startled, often frightened by it, and the circumstances attending the onset are vividly impressed upon the memory of even the thoughtless and the least observant.

Slight indirect violence.—You inquire first as to *indirect* violence, making especial note of any slight strain in lifting, over-fatigue in walking, or any jerk or jolt of the body which has been followed immediately or almost immediately by the appearance of blood in the urine.

* CASE 12. *Typical case of turpentine hæmaturia.*—C—, æt. 31, a brick-layer. On Sept. 16th, 1891, on the advice of one of his mates, he took a teaspoonful of sugar, saturated with turpentine, before going to bed. Usually he sleeps the night through, but this night he awoke at 4 o'clock with an intense desire to pass water. He was called again at 5.30 and again at 6, the intervals rapidly lessening until about 8 o'clock, when after finishing the act he was compelled to try again and again, straining to get rid of "something." In the afternoon he passed bright red blood. This continued until the 19th, appearing after the stream of urine.

Sept. 19th.—Blood abating, appeared for treatment; urine contained no turpentine.

Sept. 20th.—Easier altogether. Well in a week.

† Prout ('Stomach and Urinary Diseases,' 1840, p. 23) records his experience thus:—"I saw about the time the cholera prevailed and a little afterwards more cases of oxalate of lime calculi and of formidable hæmorrhage from the kidneys than I had ever previously seen during the whole of the long period that urinary diseases had occupied my attention."

A. *The Diagnostic Significance of the Effects of Slight Indirect Violence in Symptomless Hæmaturia.*

In patients over forty (an arbitrary age depending upon statistics) with unsuspected softish growth of the urinary tract, it is often a slight strain which appears to be the cause for the first attack of the hæmorrhage. Some affirm that they feel or hear something "snap" or "give" on making some slight exertion, such as lifting an article of furniture. In four of the ten cases of (proved) renal carcinoma which have been under my observation (Cases 2, 4, 5, 6, page 23) some slight indirect violence had obviously induced the flow. In one third of the cases in the list of (proved) soft vesical growth (Cases 7, 8, 10, 20, 27, 34, 43, 45, 47, 48, 50, table, Appendix C) the onset hæmorrhage was apparently in direct relation to some form of slight traumatism. In two of the fifteen (proved) cases of carcinoma of the prostate (Section VI) the bleeding followed immediately on indirect violence. The smallness of the number in the latter group probably depends on capsular protection.

Should, therefore, a slight strain or decided extra exertion be immediately or almost immediately followed in an adult over forty by a smart attack of hæmorrhage, you may with reason suspect a friable pre-existing growth. You might argue that the slight traumatism has evoked a growth; and that it stands to the growth, subsequently found, in the relation of cause and effect. Not so. Though it is beside the question before us I may remind you that the cystoscope has taught us that soft malignant growth of the bladder may grow latently, unsuspected by the practitioner or patient, and that cases have been examined within a week or so of the onset of hæmaturia and the growth discovered, and hence the onset of hæmaturia does not herald the birth of a growth, but usually denotes a tear or degenerative change in the surface of one already formed.

The question which is at once suggested by the foregoing statement is, "Are benign growths similarly affected by indirect violence?" Benign vesical growths as compared with malignant vesical growths are comparatively rare, though Sir Henry Thompson asserts the contrary.* My material is

* I commented as follows upon this important statement in 1889, when my experience of bladder tumours was much smaller ('Brit. Med. Journ.,' May 4th,

therefore hardly large enough to speak dogmatically upon the point, but such as it is, it indicates that indirect violence starts a hæmaturia in the benign variety much *less often* than it does in the malignant. In only two cases out of fifteen (Nos. 6 and 11 in list of benign growths, Appendix E) could I trace the onset of the hæmorrhage to a blow or to an over-exertion.

Theoretically—and I do not press the suggestion upon you for acceptance—I account for this in the structural differences of the stalk or base of two varieties of the tumour; that of the benign type being less rigid and less friable than the malignant, for it is composed of tissue more approaching the normal in character. I would suggest that the surface of a purely benign growth, *e. g.* the villous processes, is much less damaged by the succussions of the water in the bladder than is the easily tearable neoplastic base and surface of a carcinomatous tumour, for the latter is soldered on to the wall, and the attachment has to bear the strain of the stretching of the adjoining muscle as it yields before the momentum of the urine in shocks to the body or bends before the compressing force of suddenly exerted intra-abdominal pressure. My judgment has been thus often biassed in favour of a malignant growth being present if I find the *onset hæmaturia* is the direct result of slight violence.

When the hæmorrhage from a fibro-papillomatous tumour has become established, exercise may produce fresh hæmorrhage, and this is especially the case when the tumour is large.

If in the youth or young adult a slight traumatism produces a symptomless hæmaturia, there is perhaps some pre-existing renal disease (chronic Bright's), which an examination of the urine may reveal in the shape of low specific gravity, albumen, and casts.

1889):—"Sir H. Thompson has said ('Diseases of the Urinary Organs,' eighth edition, p. 411) that 'villous growth (papilloma) is in fact of all varieties that which most commonly affects the bladder.' This is not supported by the statistics of the removal of vesical tumours, which show a very large percentage of recurrences; nor is it warranted by the number of 'cures' effected. Thus, out of 29 cases, Sir Henry Thompson records 5 complete cures (*ibid.*, p. 426). Again, Guyon ('Leçons Cliniques,' 1888, *vide* the 'Journal,' December 8th, 1888) has reported 22 cases of vesical growths upon which he has operated, and only 3 of these were benign. My own list for this last year comprises 20 cases of vesical growths, and only 2 of these were benign. Moreover, in preparation of the Jacksonian Prize Essay (1888) I examined the various museums of Europe, and found 150 to 200 cases of carcinomatous vesical growths without difficulty, but only about 50 specimens of undoubted papillomatous growth."

B. *The Diagnostic Significance of the Effects of Slight Indirect Violence in Hæmaturia with Symptoms.*

You have been taught this axiom: "If hæmaturia depends on exercise you ought to suspect a calculus." Quite right, but do not limit your suspicions. Exercise, not necessarily of a violent character, has the same effect in producing or increasing a hæmaturia dependent on moveable kidney, hard carcinoma of the bladder, large villous growth of bladder, tubercular ulceration of the bladder, large senile prostate, and movable kidney. On the contrary, if the hæmorrhage persists in spite of absolute rest you may exclude stone, and entertain the idea of ulcer or growth.

Should your patient have had symptoms of urinary disease previous to the onset of the hæmorrhage your diagnosis will be more easily made, for the pain or the frequency of micturition will afford you a clue to the site of the disorder, and the judicious use of the sound, combined with a careful rectal examination of the prostate and the base of the bladder, may reveal the cause.

Let us now examine the tables.

1. *Symptomless Hæmaturia.*

*Symptomless hæmaturia** in which pus is absent from the urine, and the prostate and the urethra have been found free from disease.

Onset sudden, course intermittent, painless for months	a. Renal	{	Blood usually profuse and bright; intimately mixed	}	Renal cancer.
	b. Vesical	{	Blood moderate, but bright; intimately mixed	{	Granular kidney; renal syphiloma; cardiac disease.
	b. Vesical	{	Blood intimately mixed, but probably noticed pure at end of clear micturition at some time or other in course of case	{	1. Sessile or short-pediced benign growth away from orifice of urethra. 2. Epitheliomatous tumour of posterior wall or sides.

From this table you will see that if there be no co-existing symptoms of pain, frequency of micturition or pus, you can classify hæmaturias into two groups—renal hæmorrhages and vesical growths.

* The pain due to passage of clots is not of course taken into account, being merely temporary and of mechanical origin.

We will presume that you have made up your mind as to the source, so that we shall now discuss each bracket in turn.

(a) THE RENAL GROUP.

*Renal growth.**—Of all renal hæmorrhage, that which proceeds from a renal growth is by far the most alarming. The bleeding is profuse, spontaneous, or recurs on the slightest exercise, is very exhausting, and often ceases abruptly from a clot becoming impacted in the ureter, long vermicular clots being usually expelled just before or just at the end of the attack.

Renal colic may arise from transient impaction of clot in the ureter, and when the clots in the bladder are large there may be some difficulty and straining in evacuating them; but with these exceptions and the hæmaturia, renal carcinoma is usually a symptomless affection at first. Of the ten which have been under my care not one had pain beyond a slight backache and feeling of lassitude, due to the excessive loss of blood for the first nine months. In seven I could find no tumour. Pain in the back was, however, induced as the growth progressively increased and involved the surrounding structures. The hæmorrhage, probably by depleting the vessels and relieving tension, usually lessens the pain.

Pain is, however, experienced if swelling from nephritis ensues. In two cases not quoted in my list I have known great pain produced by septic inflammation of the carcinomatous kidney. In both cases I believe that the acute suppurative nephritis was the result of catheterism, and death occurred in the very earliest stage (compare Treatment, Section IV). The profuse hæmorrhage of renal carcinoma is sometimes rivalled by vesical malignant growth. In the latter, however, cystitis and the necrosis of the growth rapidly supervene and produce a typical stinking urine, which condition is never noticed, I believe, in renal cancer. If a tumour is discovered in the position of the kidney the diagnosis is almost certain. In the earlier stages and in fat subjects it is very difficult, however, to speak decidedly as to enlargement of the organ.

* Hæmaturia appears in 50 per cent. of renal carcinoma (Ebstein). The hæmaturia usually appears in children after the tumour has been recognised. Thus Leibert, who has collected over 50 cases, notices that in 36 cases a renal tumour appeared first; and in 19 cases a hæmaturia was the first symptom.

No.	Published.	Initials and age.	Character of onset.	Pain?	Renal tumour.
1	Path. Trans., vol. xxxviii, p. 166	S., 64	Passed a blood-clot, then immediate and profuse hæmaturia	Pain less for 10 months	No renal tumour felt.
2	Lancet, 1887, "Corkage of Ureter"	J. L., 53	Severe blow on chest, immediate and profuse hæmaturia	Pain less for 13 months	No renal tumour felt.
3	Case 1, p. 5, E. H. F., unpublished	B., 53	Small red fishing worms for 12 months, then a rush of blood and huge clots	5 years only; a throbbing in back relieved by the hæmorrhage	Enormous renal tumour.
4	Case 2, p. 5, under Dr. Hall, unpublished	D., 54	After carrying bundle of heavy sticks profuse clot, colic	Tender right kidney	No renal tumour felt.
5	Case 3, p. 6, partially recorded in Electric Ill., 2nd ed., p. 195	G. W., 44	Lifting a weight felt a snap, followed by liquid blood <i>per urethram</i>	Pain less, but weak left side	No renal tumour felt.
6	Partially recorded in Electric Ill., 2nd ed., p. 193	C., 52	Onset after severe coughing, dark red, dependent on exercise, clot like an 8 F. catheter	9 months pain at iliac crest	No renal tumour felt.
7	Unpublished, under Dr. Cock,	J., 42	Urine slightly coloured for a few weeks before a sudden onset of colic, long clots passed, profuse hæmaturia	9 months pain less, then pain like a knife digging into left side	No renal tumour felt for 9 months.
8	Path. Trans., 1892	D., 47	Profuse hæmaturia	No pain in side	No renal tumour felt.
9	Unpublished	E., 4	No hæmaturia	No pain	Enormous tumour.
10	Unpublished	B., 54	Profuse hæmaturia	No pain	No tumour.

Renal Disease.

Chronic Bright's disease.—It is hardly to be expected that I should venture to teach you the medical aspects of renal disease, and I certainly should not attempt a subject which is beyond my province did I not wish to impress upon you certain facts concerning which I believe you are taught but little.

As students we have come to regard hæmorrhage in any form of Bright's disease as being "generally insignificant."* The smoky or beef-tea coloured urine which is seen in acute Bright's disease represents, in our minds, only too often the

* Sir W. Roberts, 'Renal Diseases,' 4th edit., p. 144.

amount of blood which can be lost in chronic disease of the kidney. But this is fallacious. I do not think that the profession has realised that a very abundant and intermittent, often bright red hæmorrhage may occur in chronic contracting granular kidney. This occasional brightness is a source of fallacy. I have met with various examples, and have thought, until quite recently, that the subject had been overlooked,* but my attention has lately been drawn to papers on the same subject by Dr. West† and Mr. Bowlby,‡ which were published before my note.

CASE 13.—We recently had a patient in Mary Ward who had bright renal hæmaturia due to granular kidney. R. P—, æt. 31, a machinist, was sent me by Dr. Purcell for electric cystoscopy in order to ascertain the source of a very bright hæmaturia. She gave the following history :

A year before admission she had a slight scuffle with a young man who tried by force to make her sit down upon a chair. She exerted all her strength to prevent him. The next morning she passed “a quantity of blood mixed with the urine.” Since this date she has continued losing blood.

Present condition.—When she was admitted there was no frequency of micturition, no pain, no family history of phthisis, no cardiac disease. The urine was 1012, containing $\frac{1}{2}$ albumen and occasionally casts; it was dark red from admixture of blood. The secretion varied in colour in the course of a few days, being first red, then like coffee, and lastly of a claret shade. Hæmin crystals, blood-corpuscles, and epithelium were found in the deposit; latterly she had had a dull aching on the right side.

On examining the bladder with the electric cystoscope it was noted that after repeated washing the mucous membrane was still murky and blood-stained, the posterior wall looked furred, and the decolourised blood-clot which filmed the surface here and there gave it the appearance of being ulcerated. Knowing how easily a surface long stained with blood can deceive the eye, I patiently kept on washing until the mucous membrane appeared clean. Then with an eight oz. distension the bladder base was unfolded and the ureters examined; a long red banneret of blood was seen issuing from the right ureter. This efflux was rapidly repeated, and many of those present were able to watch the phenomenon. She was placed in bed and fed exclusively on milk. The blood diminished gradually, the sp. gr. rose to 1020, casts disappeared, and she was dismissed cured in three weeks.

I could multiply such cases, for they form about 12 per cent. of the obscure hæmaturias sent to me for cystoscopy.

* Author, ‘Electric Illumination of the Bladder,’ 2nd edit., p. 195.

† Dr. West gives three valuable cases, and mentions the following, which came under Dr. Sharkey’s care at St. Thomas’s Hospital :—“The patient, a young girl, passed so much blood with the urine that the bladder was sounded, and the surgeon failing to find a stone suggested dilatation of the urethra and digital exploration of the bladder. To this Dr. Sharkey did not, for good reasons, consent, and the patient died. No stone was discovered in the autopsy, but markedly granular kidneys.” (‘Lancet,’ 1885, vol. ii, p. 104.)

‡ Bowlby, ‘Clin. Soc. Trans.,’ vol. xx, p. 147.

Young women who attribute the cause of the bleeding to a slight strain, such as over-lifting, over-reaching, or to falls on the buttock, form the staple of my list. They are recognised by the low sp. gr. of the urine, the albumen, and casts which are usually present, to which may be added the cardiac and retinal changes.*

There is rarely any pain or inconvenience present. In certain cases there may be slight frequency of micturition, which may mislead you, but usually this is the "frequency of quantity," and not of irritation. (Compare Prognosis, p. 86.)

Renal Syphiloma.

You are taught that syphilitic affections of the kidney may be attended with albuminuria; I should like you also to remember that they may sometimes give rise to a symptomless hæmaturia. In men it will be as well for you to inquire as to syphilis. I have had three well-marked cases of renal hæmaturia in patients who I knew to have had severe secondary syphilis. I am aware the anatomical changes in the kidney in tertiary syphilis may be of two kinds, viz. those due to chronic congestion or irritation, such as the granular and lardaceous forms, or those special to syphilis, isolated gumma, and interstitial hyperplasia,† and that it is difficult to distinguish clinically between the two kinds, yet the practical point is that iodides check the renal bleeding when other drugs fail.

CASE 14.—I was asked by Dr. Marcus Allen, of Brighton, to examine a gentleman, æt. 40, who for nine weeks had had a very bright, symptomless hæmaturia—so bright, indeed, was the urine that the blood was agreed, in consultation with Mr. Couling, to be of vesical origin. Neither the "Pharmacopœia" nor rest had affected it. On turning down the clothes, however, to examine the bladder with electric light I noticed a tertiary syphilide on the thighs, and on introducing the cystoscope the blood was seen issuing from the right ureter. Potassium iodide in five-grain doses thrice daily was therefore exhibited, and the bleeding ceased in a fortnight. My notes unfortunately do not contain any reference to the sp. gr. or microscopy of the urine.

The second case (Case 15) to which I wish to draw your attention is a female, Mrs. L—, æt. 32, in Mary Ward. She has been sent me, by Dr. Power, of Poplar, for excision of an epithelioma-like ulcer of the left tonsil. The growth has been noticed for six months. I have shown you a ragged, hard ulcer, involving the left tonsil and a little of the adjoining left anterior pillar of the fauces. It is very like epithelioma,

* Cf. Appendix A, Sir George Johnson's remarks.

† Berkeley Hill, 'Syphilis,' p. 286.

but a few doses of iodide has proved it to be syphilis. I knew this patient had contracted syphilis from her husband, for I learnt her history when she came under my care in May, 1888, and again in 1889, with profuse hæmaturia. The urine in 1888 was so bright that I thought it due to a villous growth. There was no frequency and no pain. With the cystoscope the bleeding was proved to come from the right kidney. There was a strong presumption that there had been some syphilitic change in the kidney.* She has not been troubled with any further attacks of hæmaturia.

Renal Hæmaturia in Certain Cardiac Affections.

Upon the pathology of this disorder I cannot enter; let me remind you, however, that in some cases of cardiac disease renal hæmaturia, apparently of a beneficial character, may ensue. The bleeding is often of a renal type, and is usually darker than in granular kidney or syphiloma. I have had several cases, but lack confirmatory autopsies. In three of these a marked systolic bruit at the apex was present.†

Such cases as villous growth of the pelvis‡ of the kidney, and renal bleeding in hæmorrhagic diathesis,§ need not occupy

* The epithelioma-like ulcer of the tonsil healed in three weeks under a mixture of iodide and mercury.

† CASE 16.—*Typical case.*—Lieut.-Col. T—, æt. 54, sent by Dr. Ligertwood, August, 1889. Hæmaturia for six months. Three months previous to onset of bleeding patient had an attack of hemiplegia. No residual urine in bladder, prostate not enlarged, urine intimately mixed, darkish. Patient has aortic diastolic bruit. Source left renal. "Bleeding continued for a month after examination and then ceased suddenly; his health for a time improved, but the heart trouble increased; cardiac asthma has become distressing, and is leading rapidly to the end."—Extract from letter from Dr. Ligertwood, June 21st, 1890.

‡ *Villous tumour of the renal pelvis.*—A case of this very rare disease has been operated upon by Mr. Thomas Jones, of the Manchester Royal Infirmary. The patient was a man æt. 55. The one prominent symptom in the case was the free hæmaturia, which had continued without interruption since the commencement of the attack, eighteen months previous to the man's admission to hospital. He removed it with the finger and a Volkmann's spoon, the surface from which it was dislodged being smooth, clean, and vascular. The patient made a good recovery.—Thomas Jones, 'Medical Chronicle,' p. 267, July, 1891.

§ Senator, 'Berlin klin. Woch.,' No. 1, 1891.—A young lady suffered from long-standing, frequently recurring, and profuse hæmaturia, proved by cystoscopic examination to come from the right ureter. There was no pain, and her age discouraged the diagnosis of malignant disease. She belonged to a family of bleeders, and her father and mother were cousins. As a last resource the right kidney was extirpated. The result was most favorable, as two days after the operation the hæmaturia disappeared and did not return. The kidney appeared quite normal. Senator thinks that this case suggests that in some instances hæmophilia is due to a local defect in the walls of the vessels.

our attention, for they are among the rare cases, and you are not likely to meet with them. I do not wish, moreover, to over-burden you with causes.

(b) THE VESICAL GROUP.

The second half of the table of the causes of symptomless hæmaturia (non-suppurative) has now to be considered. You notice it only contains vesical tumours.

It would, perhaps, have simplified the separation between benign and malignant growths if the former were unknown past middle life, and if the latter were never met with before the usual cancerous age of forty-five. Unfortunately any distinction in the matter of age is unreliable.

A more hopeful view may certainly be entertained of a growth occurring in the young adult, but youth does not carry immunity from malignancy. A glance at the list of cases of hard cancer of the bladder (Appendix D) shows the youngest to be 32 (Case 37), and in the list of soft cancer the youngest is 35 (Case 14, Appendix C). On the other hand, in the table of benign growths you will notice ages 64, 60, 65, 72, 71 (Appendix E).

*Vesical growth.**—You will notice that the table represents the hæmaturia of epitheliomatous tumour of the bladder to be symptomless for months—I might say in some cases for over a year or more. You will remember that Sir H. Thompson† has endorsed the axiom enunciated by Professor Gross. He asserts, “In most of the cases in which the tumour was of the malignant type or approached thereto, pain and frequency of passing water generally preceded the appearance of blood, sometimes for a considerable period of time.” I have for long‡ been certain that this is a decided error, and you will do well not to be misled by such a dictum laid down in pre-cystoscopic times. 76 per cent. of my cases of cancerous tumour of the bladder show it to be incorrect. A soft malignant tumour springing from the posterior wall may grow quietly, even latently, for months before it induces pain or frequency. In fact, you may say, given: a soft malignant growth of the mucous membrane so placed as to be out of the region of the sensitive neck of the bladder, no frequency

* In rare cases hæmaturia may be absent (Guyon, ‘Gaz. Méd. de Paris,’ June 17th, 1890).

† Thompson, ‘Tumours of the Bladder,’ 1884, p. 66; Gross, ‘Diseases of the Urinary Organs,’ 3rd edit., p. 146.

‡ Cf. author, ‘Brit. Med. Journ.,’ 1889, May 4th.

or pain will be induced until the wall becomes infiltrated, the capacity of the bladder markedly diminished, or until cystitis is evoked by the necrosis and irritation of the growth. This rule, so directly opposed to accepted axioms, is so important that I place before you the following evidence in its support. I have drawn out a list* of the first fifty cases of carcinoma of the bladder which have been under my observation since the introduction of the electric cystoscope, discarding those collected in previous years.

I could increase this list to a hundred, but fifty will afford us sufficient data. I have divided the patients into two classes, according as hæmaturia or vesical irritability and pain ushered in the symptoms. In the former class (C) there are 38 cases, *i. e.* in 76 per cent. of carcinomata hæmorrhage is the first symptom. In the latter class (D) are 12 cases, *i. e.* in 24 per cent. of carcinomata, frequency of micturition and pain are the onset symptoms.† Upon what does this difference depend? The former class (C) you will find comprise the soft epitheliomata of the mucous membrane situated away from the urethral orifice. The latter (D) contain carcinomata of the hard type, those which infiltrate the muscle wall very quickly, and which set up irritative cystitis very early in the course of the complaint.

But if our axiom is wrong concerning the onset symptoms in carcinomata, is it correct in benign growths? Not altogether. Sir Henry Thompson asserts, "The earliest symptom (in benign growths) is mostly hæmorrhage. It is observed before unduly frequent micturition is complained of, and before it is painful." I shall show you this is *incorrect* in those cases where the benign tumour overgrows, overlies, or presses on the urethral orifice. In these instances frequency of micturition and pain appear first, but they are rare cases, being 8 per cent.

* Lists in Appendices C, D.

† As these lectures were passing in abstract through the press I received from M. Albarran, of Paris, a copy of his very excellent and beautiful work on 'Tumours of the Bladder.' I find his statistics (p. 182) confirm these views.

MODE DE DÉBUT DES TUMEURS DE LA VESSIE.

Sur 200 néoplasms où le mode de début est indiqué	{ Hématurie	148
	{ Cystite, douleurs en trouble de la miction	52
Papillomes	{ Hématurie	57
	{ Troubles urinaires	5
Cancer	{ Hématurie	70
	{ Troubles urinaires ou douleur	30

The Character of the Hæmaturia of Benign and Malignant Growths.

The long duration of a symptomless hæmaturia due to growth points to non-malignancy, but, with this exception, the character of the bleeding of a benign growth cannot be said to differ very much at first from that which marks the hæmorrhage of malignant tumours.

(a) The Life-history of Hæmorrhage in Benign Growths.

The history is often of long duration—a matter of years, not months. Usually it commences insidiously at first; perhaps it appears in the form of small darkish clots, “like flies,” which disappear only to reappear in a few days, or the urine may be merely discoloured, or a little blood may be passed at end of clear micturition, or the whole secretion may be of a dark coffee-colour. The patient may connect the onset with over-fatigue, but I believe this is uncommon. It is also rare, as far as my experience goes, for a profuse arterial-coloured hæmorrhage to form the onset attack. The hæmorrhage recurs unexpectedly, causelessly, at longer or shorter intervals, as the tumour increases in size, though the decreasing length of the periods of rest do not necessarily indicate increase of size of the growth.

The larger the tumour or the wider the area occupied by the base, the greater is the tendency for the bleeding to recur after exercise or over-fatigue. In the male, coition will induce an attack or increase the bleeding. It is usually more under the control of rest than hæmorrhage from a malignant surface. Probably it will be, now and again in the course of the case, of a distinct vesical type, *i. e.* blood at the finish of clear stream.

The hæmorrhage is rarely of the violent arterial type, though I have known one or two patients blanched with the loss; usually it is more persistent and darker. As the growth approaches the urethral orifice, either by lengthening of its stalk or by overgrowth, it is exposed to greater damage and the bleeding is more severe, but other symptoms in this case appear, and such cases will be considered in the class of Hæmaturia with Symptoms.

The hæmaturia may be checked by intercurrent disease

(e. g. carcinoma of the breast, acute rheumatism, or some fever) for a time, but recurs after the interloper has been removed or subsides.

CASE 17.—Thus a patient, sent me by Dr. Field, of Bath,* suffered for four years from intermittent hæmaturia due to a small, firm, hazel-nut sized sessile fibro-papilloma of the left side of the bladder base. These regular and almost periodic attacks then suddenly ceased, and a carcinoma of the right breast rapidly developed. Sir W. Scovell Savory confirmed the diagnosis, and the gland and its contained scirrhus mass were amputated. Four months after the operation wound had healed the hæmaturia reappeared, and intermitted with its former characteristic persistency. For another eight years the bleeding continued. The patient then came under my care, in April, 1889, and the tumour was freely dissected off the muscle-wall of the bladder. The hæmaturia ceased.

After its removal a small hard wart appeared in the skin of the axilla. This has been growing slowly larger, so that at the end of nearly three years (February, 1892) it was an obvious plate of skin cancer, two inches in diameter. The hæmaturia suddenly reappeared in February, 1892, but it ceased abruptly on the carcinomatous patch being removed in March, 1892, by Mr. Scott, of Bath. I am unable to say if the vesical growth has recurred or not, for I have not re-examined the bladder, nor do I as yet know whether the hæmaturia has been permanently arrested.

(b) *The Life-history of the Hæmaturia of Malignant Growth.*

Presuming the medical man to have induced no cystitis—and this is uncommon—the hæmaturia of soft malignant growth, situated away from the neighbourhood of the ureters, may be symptomless for months, the average duration of the stage being probably nine months. After this the inevitable cystitis supervenes, or the muscle-wall will become infiltrated, and frequency of micturition and suffering will ensue.

The onset hæmaturia is sometimes slight, as in benign growths, but more often than not it is profuse, the urine being very dark or maroon-red with clots. The patient in many instances traces it to a slight indirect violence. At first it is intermittent, its return usually depends on exercise, its cessation upon rest, but it rapidly loses these characters. It becomes more or less persistent, and is not so easily affected by drugs. It acquires the characters of the washings of flesh, and becomes offensive. The colour becomes changed by the alkalinity of the urine; muco-pus, débris, and phosphatic grit appear in the secretion.

In distinguishing between these two classes of hæmaturias I do not think you will gain much by discovering villous pro-

* Partially recorded in 'Elect. Illum.,' ed. 2, p. 163.

cesses in the urine, or by pulling them off the surface of the growth, as Sir Henry Thompson* suggests, by means of a light lithotrite. If the microscopy of pieces of growth removed by means of operation is a tragic farce as regards the real character of the growth,† still less will the true nature of the growth be shown by a microscopy of these villous tags.

Forty-one per cent. of vesical carcinoma have a surface covering of villous processes, whilst in half the cases of villous cancer, villous papillomatous growths of the *pure* type co-exist in the bladder with the carcinoma, apparently produced by irritation.‡

* Sir H. Thompson, "Vesical Tumours," 'Brit. Med. Journ.,' 1890, pt. 2, p. 332, foot-note.

† *E. g.* Case 8, Sir H. Thompson, 'Tumours of Bladder,' 1884, p. 103. The growth, "bitten" or "chewed" off at the operation, was reported to be "composed of normal bladder tissue, fimbriated papillæ abundant; no structure resembling malignant growth was found," but the patient "died two months after with secondary malignant growth in thigh."

‡ Author, 'Path. Trans.,' 1888, vol. xxxix, p. 180, and Jacksonian Prize Essay, p. 144, viz. 17 out of 46 cases of *single* carcinomatous tumours had villous coverings. 18 out of 36 *multiple* carcinomatous tumours had villous surfaces.

Pure villous tufts co-existed in one sixth of the cases of sarcomatous tumours, and one fourth of the epitheliomata.

SECTION III.

HÆMATURIA ACCOMPANIED BY OTHER URINARY SYMPTOMS—RENAL SYMPTOMS CO-EXISTING WITH HÆMATURIA—VESICAL SYMPTOMS CO-EXISTING WITH HÆMATURIA.

2. *Hæmaturia with Symptoms.*

USUALLY hæmaturia is accompanied by symptoms such as urethral pain, difficulty or frequency of micturition, or these develop in the course of the disease. They often permit us to locate the disease with certainty.

A. *Renal Symptoms co-existing with Hæmaturia.*

- | | | |
|---|---|--|
| i. Hæmaturia preceded by pain in the kidney | $\left\{ \begin{array}{l} a. \text{ Frequency marked at night; } \\ \text{pus and débris passed usu-} \\ \text{ally in early stages. Blood} \\ \text{unaffected by rest} \end{array} \right.$ | Primary tuberculosis of kidney. |
| | $\left\{ \begin{array}{l} b. \text{ Frequency of micturition if } \\ \text{present relieved by rest and} \\ \text{at night; pus in later stages.} \\ \text{Blood ceases on rest} \end{array} \right.$ | Stone in kidney. |
| | $\left\{ \begin{array}{l} c. \text{ No frequency in earlier } \\ \text{stages and without renal} \\ \text{colic} \end{array} \right.$ | Growth of bladder partially occluding or dragging on lips of ureter. |
| ii. Hæmaturia accompanied by pain in the kidney | a. Acute attack of nephritis grafted on a granular kidney. | |
| | b. Rare cases of carcinoma renalis. | |
| | c. Rare reflex (?) conditions of the lower urinary organs, <i>e. g.</i> prostate. | |

(a) *The Hæmaturia of Primary Renal Tuberculosis.*

Clinically, as well as pathologically, you will find that miliary tubercles irrupt from beneath the mucous membrane of the renal pelvis, or colonise in the glomerular zone of the cortex. As our knowledge increases, we may be able perhaps to group separately the symptoms evoked by the deposit in each of these differently constructed areas. At present this

cannot be done with accuracy, and I can only express my belief that, in the pelvic form of the disease, the initial symptoms are as follows:—Blood and pus appear in small amounts in the urine, either coincidently with renal pain or very soon after it commences; renal colic supervenes relatively earlier, evoked probably by the ulceration, but later on by the throttling of the ureter by caseous deposit; the stages of the disease are passed through more quickly, and the bladder—our index to the progress and the severity of urinary tuberculosis—is affected earlier. When the deposit is, however, situated in the cortex, it has to break into the renal pelvis before it can give rise to characteristic symptoms. Polyuria, from the irritation of its presence, is perhaps the symptom first noticed or complained of, even before the aching in the kidney. The urine is murky, and contains albumen over and above that due to the trace of pus. The hæmorrhage from these two positions also varies, hence perhaps the divergence in the opinions of writers on the subject. In the early stage of pelvic ulceration the bleeding is usually slight and intermittent; when, however, a cortical deposit sloughs out suddenly into the pelvis, there may be profuse and dark but transient hæmaturia.

(b) *The Hæmaturia of Stone in the Kidney.*

The hæmaturia of renal stone is often repeated, frequently increased by exercise, not often profuse, rarely bright, always intimately mixed with the urine, the aspect varying usually from a smoky to a porter-like colour.*

The symptoms of early renal tuberculosis are markedly like those of stone in the kidney—so similar, in fact, that a differential diagnosis in the onset stage is a matter of the greatest difficulty: the renal pain radiating to the testis, groin, thigh, and knee; the recurring, often agonising colic;

* Prout, who was an excellent and trustworthy observer, says, "In congested and gouty subjects who suffer from uric acid renal conerctions the blood often appears in the urine under the form of a dark coffee-coloured sediment mixed with uric acid gravel. This subsides after a time, leaving the superjacent urine apparently little coloured. This hæmorrhage is sometimes produced by very slight causes, as, for instance, by an active cathartic which has been taken to relieve a bilious attack. Occasionally the blood is more abundant. Perhaps on the whole renal conerctions of oxalate of lime are more apt to produce hæmorrhage than any other variety. Renal conerctions composed of the phosphates are sometimes accompanied by bloody urine; but if I were to speak from my own experience I should say much less frequently than some other forms of conerctions." (Prout, 'Nature and Treatment of Urinary Diseases,' 1840, p. 328.)

the blood and pus in the urine, the frequency of micturition, and the penile pain after the evacuation of the bladder, are all common to both disorders.

The progress of the case will, however, serve to separate the two diseases, for the bladder will become affected sooner or later in tuberculosis, and deposits will thereupon form and be found in the vesiculæ seminales, prostate, or epididymis.

CASE 18.—This patient, sent me by Dr. Hilliard as a case of stone in the bladder, will illustrate the difficulty. He is 33 years of age. Up to four and a half years ago he was in perfect health. He then had an attack of pain in the right side, which was called by his doctor “renal colic.” The character was as follows:—Blood appeared in the urine from two to seven days before the onset of the attack; it came in clots, and often the urine was very red with much bright blood. The hæmaturia ceased, and pain then seized him across the back, and coursed down the right ureter into the right testicle. He vomited, rolled about the bed in the acuteness of the agony, and passed water very frequently, the character of the secretion being normal to the eye. These symptoms lasted for twenty-four hours. “When the pain got into the small of his back, deep into his backbone, he knew he was on the mend.” No change in the urine was observed after these attacks.

I think, gentlemen, from this you will gather that Dr. Hilliard was more than justified in diagnosing stone in the kidney, but the sequel will show this view to have been incorrect.

These attacks of renal colic continued at intervals of two or three months, becoming latterly more frequent and more severe until eight months before seeing me, when Dr. Hilliard (so says this patient) “administered a medicine which drove the stone into the bladder.” All symptoms thereupon ceased in the kidney. He had neither kidney-ache nor severe hæmaturia, but the bladder became troublesome.

Five months after the cessation of renal pain he had to get up at night to pass water, and he was forced to empty his bladder more often than usual in the day. The vesical irritability increased, pain at the end of the penis after micturition set in, and in this state and with this history he came under my care, requesting to have the stone which was in the bladder removed as soon as possible. When the house surgeon, now our surgical registrar, Mr. Yarnold Mills, heard that blood had *preceded* the colics, that there was frequency of micturition *at night*, and that this symptom was not relieved by rest in bed, he very wisely placed the patient on the list for electric cystoscopy, and not for litholapaxy.

I saw him next day, and his symptoms were as follows:

“He passes water, about a teacupful at a time, every half-hour, day and night; has much glans pain after micturition. If blood is seen, it is intimately mixed. There are no testicular deposits; no prostatic deposit, but the right side of the bladder base feels shotty. No renal tumour, but there is tenderness over the right kidney. Urine contains pus; tubercle bacilli have been found. Sp. gr. is 1010.

Electric cystoscopy.—“Bladder only holds three ounces. Mucous membrane of the base is turgid, dark red, and spongy, like that of an exposed rectum. The rest of the bladder is either coated over with adherent patches of dull whitish pus, situated on an inflamed succulent purple mucous membrane, or is ulcerated. These white patches seem to be the boundaries of large superficial erosions of the surface, which have a fleecy base, and

evidently rest on the submucous tissue. Drawn over the entire surface are long streaks of glistening white phosphatic material, like snail-tracks, or as if the surface had been brushed with a mangy whitewash brush. The ureteral orifices are puffy, more especially the right. There is much pain on instrumentation. Even when deeply "under chloroform he flinches and moans on any slight over-distension, *i. e.* anything over three ounces."

I give you these notes, rough and crude in their description as they are, in order to convey to you something of the appearance of an ulcerated bladder. Dr. Hilliard was warned of the probable implication of the right testis and right lobe of the prostate which took place three months after. Since then I have had this patient under close observation for eighteen months; the left epididymis is now affected. Several collections of pus (chronic abscesses) have formed under the skin of the forearm and thigh. The testicular deposit on the right side came to the scrotal surface. It was opened, as were the other abscesses, and scraped, iodoform being packed into the suppurating cavities. He now passes water every half-hour in the day and every three quarters of an hour at night; his legs are oedematous, his sufferings great, and I doubt if he will live much longer. It is now six years since the onset of the symptoms.

These two diseases, then—primary renal tuberculosis and stone in the kidney—have in their earlier stages certain features which are common to both. The character of the hæmaturia observed in each does not afford us a means of separating them. I may therefore, perhaps, step a little aside from the object of this lecture to say a few words upon the differential diagnosis.

Differential diagnosis.—Our capacity for differential diagnosis here, as in other and similar difficulties of urinary surgery, will depend much upon our skill in cross-examining for the onset and initial symptoms, and upon our due appreciation of the nature and intensity of the irritation which has produced them. We recognise that in stone we are dealing with a foreign body confined more or less loosely in a sensitive space, and dependent therefore for its power of inflicting injury (as evidenced by the blood and pus in the urine) upon the exercise which the patient takes. On the other hand, in tubercle we realise that we are grappling with one or more foci of short-lived tendencies, and rapidly productive, therefore, of puriform urine; with foci of caustic and continuous irritative properties, which are, therefore, beyond the calmative control of posture or of bodily rest. I believe that the best indications for the diagnosis of renal tubercle are to be found

in the family history of the patient; in the appearance of pus in the urine very soon after if not coincidentally with the renal pain; and in the powerlessness of absolute rest to affect or subdue the symptoms.

Other differences, however, exist, and an attempt may be made to tabulate them thus :

Primary Renal Tubercle in Early Stage.

Family history of phthisis or cancer.

Age : Between twenty and forty.

Personal history : Perhaps tuberculous bones, joint, or gland disease; very rarely any previous urinary symptoms.

Symptoms, onset : Polyuria of a murky type (the frequency of micturition being due to the quantity passed, not to irritation), vague lumbar pain, or a sudden chill, and severe pain in one kidney, but rarely colic. Then frequency of micturition in the early stages at night from irritation of acid urine.

Colics appear later, are usually less severe, are more easily under the control of drugs, do not usually retract the testicle, and are preceded by rose-red blood if they are induced by ulceration and not by blockage.

Hæmaturia : Slight in amount, more or less persistent, uninfluenced by rest.

Urine : Cloudy at the outset from admixture of mucus and pus. Acid, low specific gravity. Light-coloured, depositing a thin layer of pus with streaks of blood, *débris* of connective tissue. Small clumps of caseous material. Albumen appears early.

Tubercle bacillus found, but with difficulty and after much search, in acid urine.*

Inoculation of urine deposit into animals induces tuberculosis (Rovsing, Jacobson).

General condition : Patient ailing, "never feels well," is anæmic, easily tired, but no loss of appetite.

Renal Stone in Early Stage.

Family history negative, or of gout or gravel.

Age : About forty.

Personal history : Negative, except perhaps the passage of sand or gravel; of a "weak" loin; of testicular neuralgia or "sciatica."

Symptoms, onset : Vague lumbar aching or a sudden colic. If frequency of micturition exist it is due to irritation; small quantities passed often, during day—not at night. This is relieved by rest.

Colics : More or less severe, according to composition and size of stone, and its position. They may be followed by blood.

Hematuria : Intimately mixed; much more marked than in tubercle; dependent on exercise.

Urine : Clear at outset, containing evidences of calculus in the shape of crystals. Acid, normal specific gravity. Pus later in course of case, and then only forming a deposit when pyelitis has been induced.

Negative.

Negative.

General condition : Patient may enjoy first-rate health between colics.

* Appendix.

(c) *Growth of the Bladder occluding or pressing on the Lips of the Ureter.*

It might at first sight appear to be unnecessary to include this in our list. I am convinced, however, that a backache or renal pain secondary to or in "sympathy" with a vesical growth has not infrequently misled practitioners into diagnosing a renal hæmaturia when in reality they had to deal with a vesical hæmorrhage. That pain is complained of in the back and in the kidney in diseases of the lower urinary organs is a matter of common observation. That this pain is usually reflex, as you are taught, I can hardly believe. I will admit the sympathy in some instances, but I have often traced it, as I thought, to rheumatic states of the muscles, and have plausibly accounted for it in the non-elimination of the urinary salts. Sometimes it is distinctly due to slight inflammation of the ureters and pelvis, the result of septic changes in the stale residual urine.* At other times it is obviously due to slight dilatation of the pelvis and ureter, the result of slight backward pressure. (Compare lecture on Pain, Section VII). Seeing that the ureteral orifices are very favourite situations for benign growth,† it is wise to briefly consider the subject, and, as an illustration of it, I place before you a patient (Case 20) from whom you have lately seen me remove a large recurrent fimbriated papilloma which was situated on the left ureteral orifice. He was originally labelled by the physician as a "malingerer." This was because no obvious cause for a severe left renal ache could be discovered. After passing through several hands and a varying antirheumatic treatment, and receiving a different diagnosis from each medical man, he developed certain bladder symptoms. He describes them as follows:—"Whilst sitting quite still I felt a sensation inwardly in my left side as if warm oil was leisurely trickling from the seat of pain towards the bladder. This feeling lasted

* Case 19.—J. C—, æt. 52, has had stricture of the urethra for six years. It admits a bougie of 22 Fr. gauge. He came complaining that his stricture was "flying up his back." He states that every third day, at 4 or 5 o'clock in the morning, he is seized with a severe burning pain in his back (renal regions). From experience he knows that his stricture needs an instrument, which he passes, and the pain is eased for two and a half days. His urine was examined. Sp. gr. 1005, acid, no albumen. Residual urine, 2½ drachms, bacterial. The stricture admitted 22 Fr. bougie. Was placed on salol. The urine rapidly improved, and the residual became free from organisms, besides diminishing in quantity under further dilatation to half a drachm. The backache left him.

† Benign growths are found at the right ureteral openings in 43 per cent., at the left ureteral openings in 26 per cent., and on the interureteral bar in 10 per cent. of the cases. (Author, Jacksonian Prize Essay, 1888.)

one and a half minutes, after which the pain I had had so long, eased. I continued sitting three quarters of an hour, and then was seized with a desire to pass water. I tried, but could not for a minute; then there came out a rush of 'pure' blood. In half an hour I made more blood." I examined him with the cystoscope, discovered a large tumour on the left ureteral orifice and base. I removed it supra-pubically, and all pain left him. This was two years ago.

Not long ago he returned, looking worn and ill; complaining of backache, so that he has to be lifted up out the bed in the morning. He says his spine has broken off short at a spot which corresponds to the eleventh dorsal vertebra. I examined him again, and found the growth had recurred and had spread more towards the urethral orifice. This I removed, with the result that he is again free from pain and is putting on flesh.

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| ii. Hæmaturia coincident with pain in the loins | { | <p>a. Acute attack of nephritis grafted on a granular kidney.</p> <p>b. Rare cases of carcinoma renalis.</p> <p>c. Rare reflex (?) conditions of the lower urinary organs, e.g. prostate.</p> |
|---|---|---|

(a) I may remind you that an attack of acute nephritis grafted on a chronic granular kidney may be ushered in with chilliness or shivering, followed by headache, nausea, or vomiting, *with pains in the loins*, and more or less blood in the urine. According to the amount of the congestion of the kidney, the blood may be quite bright red or very dark, and that frequency of micturition without pain may be present.

(b) When carcinoma of the kidney in the adult has developed very suddenly, and tension has been thus placed upon the capsule, it would seem that the onset symptom of the disease might be a severe pain in the affected side accompanied by hæmaturia. Or, again, should the pelvis of the kidney become epitheliomatous, consequent upon the irritation of renal calculus, the symptoms of the latter may be the more prominent, and pain in the kidney will precede the hæmaturia.*

(c) Mr. Henry Morris† says, "Various diseases of the prostate—tubercle, abscess, and stone—certainly give rise to symptoms which simulate renal calculus." It has twice happened to him to explore a kidney for stone with negative

* Cf. Norman Moore, 'Path. Trans.,' vol. xxxiii, p. 199. S. Coupland, *ibid.*, p. 219, reports a case in which a right malignant kidney, weighing nearly 3 lbs., was known to have been symptomless, although many calculi were found lodged in the calyces.

† Morris, 'Brit. Med. Journ.,' 1889, vol. ii, 1082.

results, and the subsequent course of the case has shown that the symptoms were caused by tubercular disease of the prostate. In another case, subsequent to the exploration of the kidney he had to open an abscess of the prostate; and in a fourth case, where nothing was found at the exploration of the kidney, a prostatic calculus was discovered after death. I give you these observations, for I place great reliance upon the accuracy of this well-known surgeon. I have not encountered such cases myself, and I therefore cannot but believe that they are rare.

I allude thus briefly to these three groups, *a*, *b*, *c*, for I do not wish you to lay great stress upon them.

B. Vesical Symptoms co-existing with Hæmaturia.

We have now to deal with a very large group, though perhaps as regards diagnosis it is the easiest of those which we have passed in review. In it vesical symptoms co-exist with hæmaturia, and these indicate the presence of an affection of the lower urinary tract—the bladder, prostate, or urethra.

For the differential diagnosis of this group you must rely not so much on the subjective as on objective symptoms. Every method of examination, the sound, the calculous fragment-evacuator, the catheter, the microscope, rectal and bimanual search, all must be resorted to.

Hæmaturia preceded by vesical irritability. Pain in the urethra, especially at the glans on urination. Pain in other localities, indicating a vesical or prostatic origin	<i>a.</i> Childhood to young adult	Vesical irritability, pain and blood, subsiding on rest	1. Stone in bladder.
		Frequency of micturition diurnal	2. Prostatic troubles due to gonorrhœa. Benign growth at vesical orifice. Vesical myomata.
		Frequency nocturnal as well as diurnal, unaffected by rest except in the earliest stages	3. Catarrhal or primary tubercular ulceration of bladder. Tubercle of prostate.
	<i>b.</i> Adult life up to fifty	Rectal evidence	4. Stricture and cystitis. Hæmorrhagic cystitis.
			5. Calculus; calculous cystitis. Hard epitheliomatous ulcer, posterior wall.
			6. Infiltrating carcinoma away from orifice. Soft carcinoma overlying orifice of bladder. Prostatic carcinoma.
	<i>c.</i> Old age	Bimanual evidence	7. Carcinoma breaking into bladder from contiguous organs.
			8. Stone in the bladder.
			9. Prostatic enlargement.

This subdivision into groups marked by the ages of the patient is neither scientific nor accurate. It is convenient only, for it serves to remind you that the age of the patient is often a useful guide to the character of the complaint. Thus stone, though occurring at every age, is most common before puberty and after 55 (Sir H. Thompson). Stricture generally arises before 35; inflammatory prostate between 20 and 30; benign growths between 20 and 40; malignant growth is most common before 10 and after 45; senile prostatic enlargement about 48 and onwards.

1. *Stone in the Bladder.*

We need hardly allude to the symptoms of stone in the bladder, they are so well known. In the child and young adult they are especially marked, because there is at these ages no prostatic enlargement which can prevent the calculus from falling upon the sensitive neck of the bladder, and from eliciting those symptoms which we recognise as characteristic of the disease. In the less sensitive bladder of the aged the stone may be lodged behind the upraised prostate, and thus be "latent" or symptomless except for the cystitis it produces. In some of these cases blood is the one symptom noticed, and that is only observed after exercise, but the urine contains pus or mucus. But there is another disease in the first bracket (a) to which I wish to draw your especial attention in connection with calculus. I refer to tubercular ulceration of the bladder, for this in its earlier stages mimics stone in the bladder very closely, and you may easily mistake the one for the other.

3. *Tubercular Ulceration of the Bladder.*

The symptoms of primary tuberculosis are very characteristic. A young male, sixteen to twenty-five years of age, often without any venereal history, with a family tendency to tubercle, suddenly experiences a pain in the glans or mid-penis whilst urinating. There is an almost immediate increased frequency of micturition in the day. Soon the night is much disturbed by constant calls to empty the bladder. These symptoms are followed in a variable time according to the acuteness of the disease, from a few days to a few months, by the appearance of blood in the urine. The blood is often profuse and very bright at one time or other in the course of the early stage, from sloughing out of the deposits; but these attacks

are for the most part transitory, and the patient usually only sees a few drops of blood follow the end of the stream of urine, strained out as it were by his efforts to get rid of "something." In 76 per cent. of my cases, frequency of micturition and penile pain were the first symptoms noticed, but in the smaller number, in which I suspect a vesical deposit secondary to some extra-urinary focus sloughed out, hæmorrhage was the onset symptom. The stream of urine is often arrested, but if you inquire carefully into the cause for this you will find that the patient checks it *voluntarily* on account of the pain; the sudden cessation, therefore, is not due to the abrupt corkage of the urethral orifice with a stone. After a few months the bladder becomes contracted, so that it cannot contain more than 6 to 8 oz., and so marked is what I may term "the distension reflex," that the patient will often kick or groan even when all corneal sensation has been abolished by ether, if the bladder is forced by syringe pressure to contain more. The urine from the very first contains traces of pus, and this increases rapidly to a thin but distinctly visible deposit. The secretion is more or less murky, of a light colour, of normal specific gravity, and it remains feebly acid or neutral until the surgeon makes it alkaline by interference. At first there are well-marked periods of quiescence, often for a fortnight or more at a time, and in these periods the irritability, pain, and blood disappear, or nearly so. From this you will readily understand that to a superficial observer the symptoms of primary vesical tuberculosis are very like those of stone in the bladder. We encounter the same irritability, the same glans pain after urination; the blood, pus, and murky urine; the stoppages in the stream, and the periods of quiescence in both. There are, however, points of difference in the patient, in his symptoms, and in his urine, which will at once lead you to doubt the existence of stone. His youth; his family history; the distressing irritability of the bladder at night; the sudden and causeless appearance of bright hæmaturia not increased by exercise nor checked by rest; the sudden relief of the supra-pubic pain and the rapid disappearance of the glans pain after the evacuation of the bladder; the persistent post-scrotal pain; the very light, acid, murky, scentless, puriform urine which is passed at the very outset of the trouble; and, finally, the periods of quiescence being uninfluenced by violent exercise, point to the tuberculous and not to a calculous nature of the disease.

The progress of the case, however, will probably dispel

any doubt, for the epididymis will become implicated, and the prostate will then be felt, *per rectum*, knobby or shotty from the deposition of tubercle.

2. *Gonorrhæal Prostatitis.*

Hæmorrhage from the vesical part of the prostate—or the posterior urethra*—such as is met with in acute prostatitis consists usually of a little tricklet of blood after micturition. As inflammation co-exists there is difficulty and frequency of micturition, with more or less pain in the penis at the same time.

The history of a recent attack of urethritis, and the examination *per rectum* revealing a swollen and tender gland, will guide you as to the cause.

2. *Benign Growths at Vesical Orifice of Urethra.*

You notice that benign growths are included in this list; and that this is not in accordance with Sir H. Thompson's† second statement, that “in papillomata the earliest symptom is mostly hæmorrhage. It is observed before unduly frequent micturition is complained of and before it is painful.” In 8 per cent. this is incorrect. In certain cases the papilloma either grows around and thus encroaches on the patency of the urethral orifice, or gets caught in that opening in the outrush of urine and obstructs the stream. In these cases straining, frequency of micturition, and pain may precede the hæmaturia. The tougher the benign growth thus situated is, the longer will be the postponement of the appearance of blood. In the tough myomata pain and frequency preceded blood six times out of nine. You may say, then, any benign growth which obstructs free micturition, or any tough growth (myomata), *may induce symptoms of frequency and pain before the appearance of blood.*

CASE 21.—From this young fellow, who was sent to me by Dr. Henry Kempster, I removed this papillomatous growth supra-pubically. He came to me one Saturday complaining of having passed bloody urine and “a piece of growth” on the previous Sunday. I inquired very carefully as to his previous history. He stated that six months previous to the appearance of blood in his water he had difficulty in micturition; at first he used to strain violently to get the urine to pass. This was accompanied by soreness in the

* I may remind you that the urethra is divided into an anterior and a posterior part by the constrictor urethræ muscle which surrounds the membranous urethra. Any fluid effused or injected in front of this muscle passes out at the meatus, any effused or injected *behind* this barrier enters the bladder.

† Thompson, ‘Tumours of the Bladder,’ p. 66, 1884.

urethra. Gradually he "gave up forcing, and let the water come as it could." He occasionally passed a drop of blood at end of micturition. There was some frequency, probably induced by the incomplete emptying of his bladder; urine 1010, phosphatic, micro-organisms being plentiful. Cystoscopy revealed "a dull, dirty-cream-coloured, non-sloughing, non-incrusted, polypoid growth implanted in the immediate neighbourhood of the urethral orifice; it was sessile; the extreme edge was covered with short villous processes, but the bulk of the growth was thick and bare. Bladder hypertrophied and large."

On supra-pubic cystotomy the growth overlay the urethral orifice, and the catheter, when it was passed into the bladder *per urethram*, had to push the tumour on to one side before its tip could be seen through the wound. The papilloma was thoroughly removed. He is now well.

Do not, then, diagnose a case of vesical growth in a young adult to be carcinoma merely because frequency and pain precede the hæmorrhage.

b. The Hæmaturia of the Middle Age Group.

(5) The hæmaturia of stricture, or of any other form of urinary obstruction, *e. g.* prostatic enlargement, &c. This may take place either from the kidney, the bladder, or the urethra (including the prostate). That which is purely urethral, and depends upon the traumatism of a bougie need not be dwelt upon.

The renal or vesical hæmorrhage which follows upon the passage of a bougie or catheter may be dangerous from its very profuseness, and may cause considerable alarm and anxiety in its immediate consequences.

Renal hæmorrhage.—There are three main forms of kidney degeneration met with in obstructive urinary disease;* chronic interstitial nephritis, acute interstitial nephritis, and contracting granular kidney. In each of these three forms hæmorrhage may ensue. It is most frequent in the first named, and follows (1) upon the removal of much residual

* I may remind you that in "chronic interstitial nephritis from obstruction to the flow of urine the effects of atrophy from pressure are combined with those of inflammation. The papillæ are flattened or entirely absorbed, their places being occupied by recesses continuous with the calyces. In extreme cases the pyramids may disappear and only a thin layer of cortical substance remain. If the disease be limited to one kidney every vestige of secreting substance may vanish, and the capsule may then retain its natural outline or be converted into a large thin-walled cyst." This so-called surgical kidney suffers from granular or gouty kidney as follows:—" (1) The inflammatory changes are more irregularly disposed; (2) the progress of the disease may be very rapid; if chronic, it is subject to repeated exacerbations; (3) it frequently ends in suppuration; (4) it is usually accompanied by cystitis and pyelitis; (5) the concomitant and consequent organic changes are limited to the urinary apparatus. There is no hypertrophy of the heart, nor a general systemic arterio-capillary fibrosis." (Pepper, 'Surgical Pathology,' ed. 2, p. 394.)

urine from the ureters and the dilated pelves of the kidneys. The intertubular vessels and those in the mucous membrane of the conducting channels being suddenly robbed of a support to which they had become accustomed, rupture and blood escapes freely into the bladder. (2) It may occur from a reflex hyperæmia caused by some irritation of the lower urinary tract, *e. g.* dilatation of stricture, passage of a bougie. I am convinced, however, that renal hæmorrhage under such conditions are not so frequent as vesico-prostatic bleeding, and to the latter I shall allude presently (p. 47).

In 1887 Mr. Bowlby* drew attention to hæmaturia originating in granular kidney in obstructive urinary disease, and gave two illustrative cases. I believe before this paper was read it was not generally held that granular kidney might evoke such a complication. As I have to speak fully upon this subject, I shall give you an abstract of the two cases and Mr. Bowlby's comments upon them.

The first case was a man, æt. 73, who was admitted into St. Bartholomew's Hospital for retention. He had had difficulty in micturition for some time past, and had lately used an india-rubber catheter. Seven days before admission he had complete retention, which he could not relieve. After a time urine began to dribble away, and he then noticed it was of a red colour. It had not been so before. Hæmaturia with dribbling of water from the hyperdistended bladder continued until admission.

On examination the bladder was found to reach about midway up to the umbilicus, the prostate, felt *per rectum*, was greatly enlarged, and blood-stained urine in small quantities dribbled from the meatus. The patient was in great pain and very feeble.

A catheter was passed by the house surgeon, Mr. Field, without much difficulty, and a couple of pints of dark red urine were withdrawn with much temporary relief. After this the patient was able to micturate without assistance, and during the next twelve hours he passed three pints of bloody urine.

On the morning of the 21st a catheter was passed, and the bladder was gently washed out with a solution of Condy's fluid. The hæmaturia continued during the 21st, and in the evening the patient died exhausted. The urine passed or drawn off whilst the patient was in the hospital contained a great quantity of blood, but no clots.

The specific gravity varied from 1015 to 1025. The reaction was alkaline. A post-mortem examination showed the prostate to be generally enlarged, the middle lobe forming a distinct projection into the floor of the bladder. The bladder was slightly dilated, though otherwise normal. It contained about a pint of almost pure blood. Both kidneys were small, contracted and granular on the surface. The cortex of each was slightly diminished. The right kidney was infiltrated with blood throughout the cortex and in the bases of the pyramids, giving it a dark purple colour. The ureters were empty, but the renal pelvis contained a little blood.

* Anthony A. Bowlby, "Cases of Profuse Hæmaturia in connection with Granular Kidney," 'Clinical Trans.,' vol. xx, 1887, p. 147.

There were calcareous deposits on the aortic and mitral valves, but otherwise the viscera were normal. Microscopically examined, the right kidney was found to be in a state of interstitial inflammation. Its connective tissue was increased in quantity, and was the seat of a small cell infiltration. There was also some proliferation of the renal epithelium, with granular degeneration of the same. The whole of the kidney was infiltrated with blood, both the renal tubes and the fibrous stroma being alike affected. The hæmorrhage was most profuse in the cortex, but was not limited to this part of the gland.

The second case was a man, æt. 49, with the following history. He had been in pretty good health until three months previous to admission into the same hospital. At that time he had pain in the loins, and his urine became very red. He passed a good quantity of water, and had no rigors or sickness. For the past six years he had suffered from stricture of the urethra and difficulty in micturition. Since his illness began, three months ago, he had passed his urine more frequently than previously, and said that it had always been red; never intemperate.

Present condition.—Badly nourished. No œdema. Arteries rigid. Pulse strong and jerky. Soft apex murmur and loud second sound. Slight cough. Temp. 97°; pulse 80.

Urine bright red, sp. gr. 1015, alkaline, contains much blood and about one third albumen; it smells foully; on standing it separates into three layers. The upper layer is smoky, the middle layer bright red; the lower layer is gritty and whitish in colour. Microscopically examined blood-corpuscles and crystals of triple phosphates are found, but no renal casts. He became semi-conscious, and died comatose, eighteen days after admission.

Post-mortem examination.—Heart: Left side much hypertrophied; weight 18 oz.; no valvular disease. Lungs: Broncho-pneumonia with consolidation at left side. Kidneys: Typical specimens of interstitial nephritis, 3½ oz. each, contracted, granular, and tough, with adherent capsules and shrunken cortex. The pelves and ureters, neither of which were dilated, contained a little blood. Bladder: Slight hypertrophy of muscular coat, and inflammation with pigmentation of mucous membrane. Urethra: Tightly strictured in the membranous portion, and a little dilated behind the seat of stricture.

Mr. Bowlby notices the obstruction to the escape of urine from the bladder in these two cases, and adds, "Judging by post-mortem experience as well as by clinical practice, I should say that interstitial nephritis is *frequently the result of such obstruction*,* and is found quite independently of those other conditions of dilatation and absorption which go to make up the "surgical kidney."

You naturally ask, If granular kidney which induces cardiac hypertrophy and systemic arterio-capillary fibrosis is able to cause a bright and profuse hæmaturia,† and if obstructive urinary disease often induces this form of renal change, as Mr. Bowlby suggests, are we to expect hæmorrhage from the kidney to be a frequent accompaniment of stricture of the urethra? The answer depends as to whether obstructive urinary disease does cause granular kidney or not.

* The italics are mine.

† Page 24.

I cannot quite accept the statement that it does so induce granular change without a large array of facts. Mr. Bowlby is well known as a shrewd and careful observer, and it is plausible to suppose that the check to the free elimination of salts which obstructive urinary disease exerts, may have a great irritative influence on the renal tissue, and that in this way contracting changes may be produced; but as far as my own experience goes I believe granular kidney to be rarely the accompaniment, much less the outcome, of stricture. My facts are these: before me are the notes of over 900 cases of stricture of the urethra which I have treated. They are of every form and degree of severity, of every length of duration, and comprise all ages. It is only very occasionally that the group of symptoms which go to form a pronounced granular renal condition has been noticed.

This list includes many of those who take care to keep the canal free. They are, therefore, not of the worst type. Hence I place before you a table* of fifty patients suffering from stricture, who have lately been under treatment in the wards, and in whom the urine has been carefully tested. I use this material, for you are well aware that this hospital is an unrivalled centre for the study of the worst type of stricture, being situated in close proximity to the shipping of the port of London, and placed in the heart of a large labouring population, as ignorant as they are recklessly indifferent to the dangers of neglected stricture.

In only 4 cases (8 per cent.) was the specific gravity under 1010; in 10 cases it was 1010.

In 9 cases (18 per cent.) albumen beyond a trace is noted, and in only two of these was pus absent, so that some of this albumen may have been due to the pus present in the specimen examined. In 3 cases granular casts are noted.

Now as regards the post-mortem arguments.

Before me are the full accounts of the post-mortem examinations of cases of urinary disease dying in this hospital during the last fifty years. I have excerpted these *in toto* from the books. In these two volumes, in which stricture alone is recorded, there is ample evidence to show that the acute and the chronic interstitial nephritis of obstruction is the usual form of renal disease found in these disorders on post-mortem.

I select the first twenty cases,† commencing with the year 1842. In five of the autopsies the patients are reported to have had healthy kidneys. In eleven there was acute suppurative

* Appendix F.

† Appendix G.

nephritis, in two great dilatation (chronic interstitial nephritis), in one the kidney was "large and white," and in one only was it "granular."

You may contend, however, that extravasation and abscess appear very often as a complication in these cases, and that the acute suppurative nephritis so often mentioned depends on the rougher method then in vogue of treating strictures; that surgery in 1842 was less scientific and more septic than that of to-day, and that evidence is therefore required, drawn from a more recent date.

Here is a table* of twenty cases treated and dying here during the years 1884 to 1892. Four are reported to have had healthy kidneys, and the condition of the rest are as follows:—Pale and swollen kidneys, 1; fatty kidneys, 1; surgical kidneys, 7; interstitial nephritis, 2; acute nephritis, 2; granular kidney, 3.

In the absence of larger and better statistics we may say that gouty or granular kidney in obstructive disease is rare, and therefore that the hæmorrhage from granular kidney, the co-existent of stricture, will be but seldom encountered.

The hæmorrhage which takes place after dilatation of a stricture is often, I believe, of vesical origin.

CASE 22.—I was asked to see a patient with stricture who had had an alarming hæmaturia after the mere passage of a bougie. I was told that the canal "had swallowed the instrument with ease." On examining the bladder with the cystoscope I found the entire surface covered with large bright red submucous extravasations. He recovered rapidly.

The hæmaturia which sometimes appears spontaneously in stricture is usually from the neck of the bladder, and is strained out by the patient from the congested mucous membrane lining the orifice. The vessels, especially the veins, of the neck of the bladder are frequently seen to be large and tortuous in tight stricture. Usually the vessels of the posterior wall are not discernible, owing to the succulency of the mucous membrane and the extreme thickness of the muscle coat which trabeculates it and slightly stretches its contained vessels.

4. *Hæmorrhagic Cystitis.*

In middle age I have met with cases of hæmorrhagic cystitis which simulate stone most nearly. These have been usually in women, and due, I suspect, to ovarian or metric troubles.

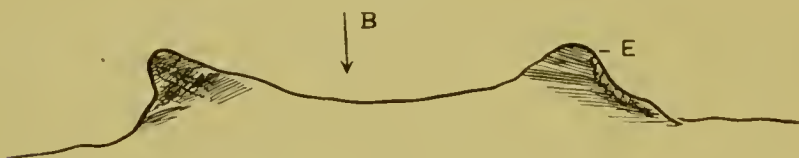
* Appendix II.

5. *Hard Epitheliomatous Ulcer.*

Hard epitheliomatous ulcer of the bladder is a rare disease. As far as my experience of it goes, it has a great tendency to induce the formation of phosphatic concretions, which are deposited on the malignant surface, and drop off with sloughs, thereby causing the patient great agony and bleeding. The bleeding in these cases is more dependent on the stone than on the hard growth, and you suspect the disease if, on sounding, you find a gritty calcareous surface at one particular spot, with a hard feeling on the corresponding rectal side, an intermittent formation of stony pieces, with pain and frequency out of all proportion to the amount of cystitis present. The most interesting and instructive case which I can place before you is the following :

CASE 23.—I was asked by a colleague to examine A. M—, æt. 32, in November, 1890. The patient was a thin, spare man, with a very marked history of tubercle in the family on the father's side. He never had had any venereal disease. Six months previously, the onset being very gradual, he began to have pain at the end of the penis when he made water, a scalding pain being left in the same position after micturition. This gradually got worse, and he began to pass "mortar." Then he had pain in his left side. Three months after the onset a few drops of blood appeared at the end of urination ; there was no straining. When I saw him first he was passing water every two hours in the day, and had to rise thrice at night. He had moderate pain in the glans after micturition, and occasionally passed blood. He showed us large pieces of necrotic débris, which were permeated with phosphate of lime salts. Prostate and testes were normal ; urine was acid.

FIG. 2.



Electric cystoscopy, November 26th, 1890.—“The left side of the bladder appeared dull, but not very unhealthy. On the right side was a wavy curtain of muco-phosphatic material, which sprang from the surface near the right ureteral orifice, and had behind it a deepish pit or dimple into which one could not see. A lithotrite was inserted and part of this veil was pulled off, but this did not clear the surface sufficiently. Injections of 1 per cent. lactic acid were advised to ‘clean the patch.’”

December 5th, 1890.—“Examined again ; no reaction after the last examination. The bladder wall was much healthier. On the right side was a crateriform ulcer with an upraised gelatinous edge (B, Fig. 2). At the inner and upper part there adhered a thick, milk-white, phosphatic, necrotic tag, which looked very white in the rays of the electric light (like dirty

sails in the sunlight). The appearance was like a chronic ulcer of the leg. The base, B, was irregular, but showed no granulations. It was apparently excavated mucous membrane. The thin inside edge was very sharp, and on the outer side was a small blood-clot, evidently the site and plug of a hæmorrhage a few days back. (Small clots were passed two days ago.) Towards the base of the bladder were two or three small deposits of lard-like aspect. They resembled a dry herpes zoster or a travelling neuritis. The bladder wall was unindurated at the site of the ulcer."

Being pressed for my opinion, I was forced to acknowledge that I did not know the nature of the ulceration, but entirely disagreed with the diagnosis given by my colleague that it was a villous growth. I suggested it might be a rare form of tubercular ulceration, and that this would agree with the family history. As I had never seen so evenly cupped an ulcer, unless it was hard epithelioma, and as I had proved from museum specimens that these were rare, and as the patient was only thirty-two, I did not venture on this diagnosis, but obtained permission to re-examine later on, and to watch the progress of the case.

The man disappeared, and I traced him to the University College Hospital, where he was under the care of the late Mr. Berkeley Hill, by whose kind permission I was enabled to get full particulars of the treatment. I owe these particulars in the first instance to the courtesy of Mr. Hill's house surgeon, Mr. Devereux Marshall. Subsequently they were amplified by notes obtained from the hospital books through the registrar.

A. M—, admitted to University College Hospital, under Mr. Hill's care, January 5th, 1891.

January 9th.—A villous growth covered with phosphates seen through cystoscope.

15th.—Supra-pubic cystotomy performed, and *tumour removed*. It proved to be a papilloma.

Supra-pubic wound healed between February 3rd and 7th. Patient discharged on latter date. All symptoms relieved.

Next seen March 20th. Note says that he is looking very well, and putting on flesh. Can hold water four to five hours. Occasionally a small blood-clot passed.

Seen again April 3rd. Cystoscopic examination. Mucous membrane redder than natural. Ordered to wash out bladder himself with filtered boiled water.

Came again on 10th with cystitis. Readmitted April 27th.

May 13th, 1891.—Cystoscopic examination. A rough, irregular, granular-looking patch, dark red in colour, seen just behind the trigone on the posterior wall of the bladder a little to the right of the middle line, and about midway between the urethral orifice and summit of the bladder.

November 12th.—He was again admitted. Up to this date from the last examination he had been passing blood in gradually increasing quantities.

13th.—Cystoscoped, and a growth at once seen. It was situated a little above the right ureteral orifice.

18th.—Anæsthetic administered, and cystoscope again introduced. The growth could not be seen. The bladder was washed out; phosphate concretion and several pieces of soft tissue were collected from the washing. The latter microscopically presented the appearance of a new growth, but because of the element of uncertainty further operation was postponed.

December 2nd.—Supra-pubic cystotomy was performed. "The finger introduced into the bladder could feel just above the orifice of right ureter a

sessile growth an inch and a half in diameter." The surface of the growth was eupped, the margin raised and everted. The base of the growth was infiltrating the bladder walls. Since its removal was considered impossible it was not interfered with.

January 1st, 1892.—Patient left the hospital.

He now returned to his medical attendant, Dr. W. R. Cooper, of Norbiton, who on hearing of my interest in the case, and of the lamented decease of Mr. Berkeley Hill, asked me to see him. He was then (January, 1892) losing flesh; the supra-pubic wound was tucked in as one sees a nipple drawn in in scirrhus of the breast. This I afterwards proved to be due to a tough epitheliomatous deposit in the track of the bladder wound.

To give you a detailed account of the next eight months that I watched him would be tedious. Suffice it to say that, although the blood ceased after the operation, the pain greatly increased—each micturition was agony; phosphatic concretions used to come away the size of large peas in batches of three or five at a time every week, causing him inexpressible suffering. He was forced to pass water every twenty minutes day and night. If the urethra got blocked with the deposits from the feebleness of the stream, or if he could not pass them, I used to crush them into fine powder as the only means of affording him relief. The supra-pubic scar began to bulge with new growth in July, 1892, and he died August, 1892, when I obtained an autopsy, which verified the hard epitheliomatous character of the growth. The entire duration of the case was two years two months.

6. *Prostatic Carcinoma.*

The hæmorrhage is much less profuse than in vesical carcinoma, and it is certainly often absent altogether. M. Jullien asserts that the hæmaturia stands to cancer of the prostate in the same relation that hæmatemesis does to cancer of the stomach. This I believe to be incorrect. In my own list of fifteen* there is only one I can put forward as profuse,† and in this the bladder was implicated secondarily. There are two of the soft variety, in which no bleeding was noticed at all. There is nothing characteristic about the hæmaturia. It may be slight and at the end of micturition, rarely coming at the commencement of the stream. Usually the blood is intimately mixed with the urine, and is transient. The chief features are the pain, the difficulty of passing steel instruments, and the stony-like prostate as felt *per rectum*.

Infiltrating and invading carcinomata will be treated in a subsequent lecture; they are readily diagnosed, even in the early stages, by the hardness felt in the walls on rectal or on bimanual examination.

* Section VI.

† Engelbach says in 79 cases, only 21 had attacks of more or less profuse hæmaturia.

Varices of the Bladder—Piles of the Bladder.

Varicose enlargement of the veins at the bladder neck have been described under the name of Hæmorrhoids of the Bladder.* In the seventeenth and eighteenth centuries Bonetus and Morgagni paid this affection especial attention, and have each left some well-marked examples of it. You are taught that such cases are not uncommon, and that they may give rise in some instances to copious hæmorrhage. That mechanical obstruction is the cause of varix is obvious from the fact that the disease is associated with stone in the bladder, obstruction to the evacuation of urine, and organic affections of the anus and rectum. I am convinced, however, that nowadays this affection is rare. The only instances I could find in European museums were in Upsala, Sweden, Nos. 1229, 1388. They were injected with blue, which showed their character well. I do not mean to say, in cases of enlarged prostate, or in those where there has been much straining, and a lax, badly attached mucous membrane, that folds of this will not be dislocated towards the urethral orifice, sliding, so to speak, upon the subjacent muscular layer to form a fringe around that opening. This does happen, and, moreover, this succulent collar of *true mucous membrane* does arrange itself after a polypoid manner, and become congested,†

* The following description is given by Gross, loc. cit.:—"Although the disease occurs most commonly in old age, it is sometimes observed at a comparatively early period, especially in persons who have been long afflicted with stone in the bladder, stricture of the urethra, hypertrophy of the prostate gland, or organic disease of the anus or rectum. The enlargement may be circumscribed or diffused, according to the number of vessels implicated in the disease, and it may present itself in various degrees, from the slightest increase in the size of the affected vessels to the most remarkable dilatation. In the more confirmed forms the veins are not only much augmented in volume, but they have a tortuous convoluted arrangement, similar to what occurs in varix of the leg and thigh. When thus affected their walls are always more or less thickened from interstitial deposits, and their cavities are occupied by fibrinous concretions. The connective tissue through which the enlarged vessels ramify is also materially increased, forming not infrequently a thick, dense mass, divisible, especially along the *bas-fond* of the bladder, into a number of layers. While these changes are going on upon the exterior of the organ, a similar but less conspicuous enlargement occasionally takes place within the neck and most dependent portion of the viscus. The disease here consists either in a simple varicosity or in the development of vascular growths, not unlike hæmorrhoidal tumours, both in their structure, colour, and consistence. Such tumours, however, are uncommon; they seldom exceed the volume of a small filbert, and are usually situated near the neck of the bladder. In general they are associated with other diseases, particularly stone, which no doubt often acts as an exciting cause."

† I have just removed such a collar supra-pubically, and have seen others in adult life by means of the cystoscope. The symptoms are frequency, straining,

but these are not piles in the true sense of the term. I assert merely that true varices, clumps of dilated vessels which project visibly on the surface of the bladder neck, are rare. An instance occurred at the Hôtel Dieu in Paris,* in the service of Professor Laugier, in which the bleeding was so profuse as to prove fatal. The patient, who had some time previously laboured under acute myelitis with paraplegia, had been in the house several days, on account of a bony tumour, when the attack came on. The blood was of a dark colour, and was voided perfectly pure, without any admixture of urine.

Catheterism failed to detect any appreciable lesion in the bladder, which was much distended, and pushed high up into the abdomen. The hæmorrhage continued to recur at intervals, sometimes slightly, at other times copiously, until the man sank from exhaustion. The autopsy revealed the existence of several large varices at the neck of the bladder, upon one of which was a large ulcer, from which the bleeding had evidently proceeded. The organ was perfectly sound in other respects.

(c) *Old Age.*

The bleeding of prostatics.—The spontaneous hæmorrhage in the senile enlarged prostate may be smart enough in the aged or very feeble, to cause no little uneasiness for the safety of the patient. Riding on horseback, venereal indulgence, a fall on the buttock, or sudden congestion of a granular kidney which *co-exists* in enlarged prostate in 15 per cent. of the cases, are among the causes for its appearance. The blood may escape pure and free from urine, staining the shirt or bedclothes, and leading the medical man to suppose that it originated in the anterior urethra. It may appear either at the commencement or the end of the stream, or it may pass into the bladder and mix with the contents of that viscus. The history of the case and rectal examination will be sufficient guide to you, though in some cases of unilateral soft enlargement a doubt may arise in recent cases whether you are not dealing with soft carcinoma of one lobe.†

The following case of spontaneous bleeding of an enlarged prostate will serve to illustrate the latter statement.

penile pain, hæmorrhage—in fact, those of an early enlarged prostate. Residual urine is always present.

* 'Gaz. des Hôp.,' No. 81, 1854, p. 321, quoted by Gross.

† Author, 'Brit. Med. Journ.,' October, 1887.

CASE 24.—I was asked by Dr. Goodson, of Leytonstone, in January, 1890, to see a gentleman æt. 60. I learnt that two years previously the patient had had an attack of vesical bleeding, since which time he had had occasional attacks of vesical irritability. Five weeks ago he was seized with retention, and a red curved gum catheter was introduced readily, and three pints of urine were withdrawn. After three days' catheterism he began to pass pure blood through the catheter. Washing out checked this to some extent. A great deal of pain and spasm was present. There was an unusual amount of tenderness over the bladder, so that even the finger tapping this region caused pain. On passing water he had pain at the end of the penis, and caught hold of the organ so tightly as to bruise it. This relieved the pain. Latterly he had been losing flesh; the glands in the right groin were enlarged. *Per rectum* the prostate was large and soft; the right lobe was lobulated like a fatty tumour, and stretched far above the reach of a long forefinger. The left lobe was smooth, much smaller than the right, though decidedly enlarged. The urine was copious and darkly coloured, as if with renal hæmorrhage. Two ounces residual.

I passed a sound very gently, but on reaching a very curved and lengthy urethra so much hæmorrhage appeared that I did not persist. I considered the case to be a soft carcinoma of the right lobe of the prostate.

The patient improved greatly, but died fifteen months after (March, 1891), when Dr. Goodson, jun., obtained an autopsy. The bladder was capacious, the walls hypertrophied; the prostate was very much enlarged, and of an ordinary fibro-myomatous character; on that part of the right lobe which projected into the bladder was a small sloughy ulcer, the size of a three-penny bit: there were no varicose vessels in its neighbourhood.

Of the three diseases so alike in feature which are met with in old age—enlarged prostate, stone, and cancer of the prostate—the first-named is perhaps most capable of violent hæmorrhage. The periodical bleeding following habitual catheterism need not be alluded to.

Summing up briefly the characters of the hæmaturia of this division, you may say those causing profuse loss are tubercular cystitis, carcinoma of bladder, and prostatic enlargement. The age, the frequency, the absence or presence of residual urine, and the usual methods of examination will generally reveal the cause.

SECTION IV.

TREATMENT OF HÆMATURIA.

ALTHOUGH the successful and scientific treatment of spontaneous hæmaturia depends, of course, upon ascertaining and removing the cause of the hæmorrhage, yet occasionally the practitioner is not able to do more, in sudden and urgent cases, than to combat the immediate effects of the loss of blood. We may therefore consider the treatment under two heads: A, general; B, special.

A. *General Treatment of Profuse Hæmaturia, whether due to Injury or Disease.*

Absolute rest in bed is a principle of primary importance; many severe hæmaturias can be controlled in their early stages by the recumbent position alone. It must be rigidly enforced in proportion to the severity of the attack.

The application of cold is of value, perhaps more to quiet the apprehensions of the patient than for much good it will do in the hæmaturia of the lower urinary tract. It is certainly of great value in ruptured kidney, for here it not only assists in checking the bleeding, but also mitigates the traumatic peritonitis which sometimes ensue even when the peritoneum has been untorn and the viscera uninjured. In many cases of sudden and profuse loss of blood, whether from the kidney, bladder, or prostate, the shock and exhaustion will be marked by distension of the gut, consequent tympanitis, and general but not severe abdominal pain. It is a mistake to consider this a sign of peritonitis. The application of cold often relieves this condition to a considerable extent. You may apply cold very efficiently by means of ice-bags over the loin or over the bladder; but a cleaner and easier method is by Leiter's pliable coils,* which may be moulded to any part, and through which a continuous current

* Appendix J.

of cold water can be sent. In certain cases of hæmorrhage of the bladder and prostate the insertion of ice into the rectum has certainly a good effect.*

Diet.—Solid food had better be avoided until the severity of the attack has abated.† The diet should be bland, very limited in quantity, and taken cold. If thirst be complained of, it may be allayed by sucking ice. As the patient improves, the diet may be cautiously increased. Alcohol should be avoided at first, but in a day or two port wine may be added, for it will be found a valuable astringent. As the clots which have sealed the bleeding orifices are liable to become dislodged on the slightest straining, all vomiting and retching must be checked. Nutrient enemata must be administered if the patient continue to show a tendency to sickness.

Bowels.—In profuse hæmaturia the entire intestinal canal had better be kept quiet for a few days; purgatives are contra-indicated. I have seen a copious prostatic hæmorrhage recur, and the case terminate fatally, on the exhibition of a purgative three days after a perinæal lithotomy. On the other hand, if the abdomen gets distended, and solid fæces collect, they had better be removed by means of a rectal enema of oil or soap and water.

Morris‡ states “that he has seen sharp hæmaturia from an injured kidney brought on unexpectedly more than a fortnight after the infliction of the wound, and when the patient appeared to be convalescent by the passage of hardened fæcal matter along the colon, and thus across the surface of the kidney.”

Drugs.—I cannot speak very highly of any hæmostatic drug. In ruptured kidney, or in sharp arterial renal bleeding, ergot is the most reliable. It is given in doses of half a drachm to a drachm mixed with some preparation of opium, every two, three, or four hours, according to the severity of the case. If the hæmorrhage be renal and moderate, hazeline (Hamamelis Virginica), in drachm doses, is of value. Iron aluminate is worth a trial in moderate vesical hæmorrhage. In the profuse vesical hæmorrhage in atonic bladders, ergot and nux vomica combined with gallic acid is perhaps the best

* Each piece of ice should be thrown into warm water to smooth the sharp edges of the fragment before it is pushed into the rectum.

† Morris quotes a case of injury to the kidney under Mr. Hilton's care, in which solid food, given the eighth day after the accident, seemed to be the cause of hæmorrhage which induced the fatal issue.

‡ Loc. cit., p. 142.

Port wine
valuable
astringent

Ergot

Hazeline

combination which can be employed, and gallic acid is useful in prostatic hæmorrhages.

B. THE TREATMENT OF THE VARIOUS FORMS OF HÆMATURIA.

(A) *Traumatic Renal Hæmaturia.*

Although we have not discussed traumatic hæmaturia in the diagnostic section of our subject, it is very essential to say a few words about its treatment.

(i) *Ruptured kidney.*—This is an accident you are quite familiar with, for it seldom happens that our wards are lacking in examples of injury to the kidney. The hæmaturia which may ensue from damage of the renal tissue varies in proportion to the severity of the laceration. When the cortex is slightly torn there is every reason to believe that blood may be absent altogether from the urine, but in most of the cases admitted into these wards there is more or less hæmorrhage. In some cases where the kidney has been severely contused or greatly lacerated the hæmorrhage is alarmingly profuse.

Should the bladder be empty, or nearly so, at the time of the accident, fluid blood may rapidly pour into the bladder, and in such quantities that it is passed as bright and as fluid as when it issued from the ruptured kidney.

Death from the hæmaturia of a lacerated kidney is unknown, though several cases are on record in which a fatal result was caused by loss of blood which passed through a rent in the peritoneum and poured freely into that cavity,* or in which an immense quantity of blood was effused into the circumrenal tissues.† The blood may clot and block the ureter, and abruptly check the hæmorrhage through the lower urinary tract. There is a danger in this case of the clot becoming organised, and of the ureter becoming permanently impervious; or the blood may clot in the bladder, and retention ensue. If septicity is superadded, cystitis supervenes, and pyelitis and fatal pyelo-nephritis may result. The history‡ of a patient in Mellish Ward, under the care of my colleague, Mr. Reeves, who asked me to see the case, is so good an illustration of what may occur that I give it you here in full.

* 'Guy's Hosp. Reports,' vol. ii, second series, case 21, p. 485, 1844.

† Ibid., p. 424, case 20; both quoted by Morris, 'Surgical Diseases of the Kidney,' p. 118.

‡ 'Lancet,' October 4th, 1884.

T. W—, æt. 19, fell from a cart, and was admitted into the hospital on the same day (May 13th, 1884). His seventh and eighth right ribs were fractured near the costal cartilages, and there was localised surgical emphysema. He complained of pain on the right side of the abdomen and loin, but there was no external evidence of injury. The same evening his urine contained a little blood, but only just enough to make it smoky. Between the 13th and 22nd the pain in the abdomen and flank diminished, and abdominal discomfort was only complained of occasionally, while the hæmaturia remained the same as on admission. On the morning of the 23rd he became suddenly faint, and passed a pint and a quarter of nearly pure blood, and during the next four days he passed a large quantity during each twenty-four hours. His pulse was rapid and feeble, temperature high, and surface pallid. He complained of pain over his bladder, in which region there were dulness and tenderness, so a catheter was passed, and a good deal of bloody urine and some small clots withdrawn. There was considerable vesical tenesmus, and the lad seemed to ease himself by pressing on the end of the penis. During the second week the urine became ammoniacal. On the 27th hæmaturia entirely ceased for twenty-four hours, when he had another attack, which lasted until a terebinth mixture every two hours was prescribed, followed next day by subcutaneous injections of sclerotic acid. These stayed the external hæmorrhage for a few days, or perhaps it would be more correct to say appeared to stay it, for internal bleeding must have been going on, as was shown by the large quantity of blood and clots found post mortem. The abdominal and lumbar tenderness increased; the muscles on the right were very rigid. There was great pain over the region of the right kidney and over the hypogastrium, and in the former situation there was a distinct sloughy fulness. The tongue became dryish and brown at centre, the pulse and temperature indicated inflammatory mischief, and his countenance became anxious. During the remaining week of his life there was little or no hæmaturia, but the lumbar tenderness and pain increased, and the symptoms of peritonitis supervening, he died a month after admission.

Necropsy.—Body exsanguine. Rigor mortis moderately well marked. No external sign of injury. The seventh and eighth ribs were the only ones fractured. No injury to the diaphragm could be made out, and there was no pleurisy. The abdomen contained a moderate quantity of blood-stained serum, and at its right posterior aspect was a fluctuating swelling of considerable size, on cutting into which a very large quantity of blood and broken-down clots was turned out. There was much difficulty at first in recognising the kidney, but on cleansing the parts its remains were discovered, and it was found that only a small portion of its upper and lower ends was left, and these were much blanched. The remains of the kidney substance formed a broken-down pulp. It could not be clearly made out if the renal vessels were torn, but the pelvis and upper part of the ureter, though severed in part, still remained attached to the organ. There was a rounded, venous-looking tumour in the neighbourhood of what was taken to be the hilum, which proved to be a false aneurism of a branch of the renal artery. The bladder was distended to about the size of two moderate fists. On removal its coats were found much thickened, and there was severe cystitis. It contained three large partly decolourised clots, the largest of which resembled a good-sized kidney potato. There was also some broken-down blood and offensive urine. The left kidney was found to be in an early stage of interstitial nephritis.

In commenting on this case Mr. Reeves says, "Directly it is found that bleeding is not controllable after trial of every known means, and before the patient is too weakened by hæmorrhage, and also before septic phenomena have been allowed time to develop to an uncontrollable extent, a lumbar incision should be made over the kidney, and all clots, effused blood, and débris removed, and the cavity thoroughly cleansed. Then if it be possible to make out the remains of the kidney and to find the renal vessels and ureter, these should be tied and the renal remnants removed." He also suggests that should septic cystitis ensue, and the bladder be unable to expel the clots, a perinæal cystotomy should be performed, and the bladder drained and systematically irrigated. There is no doubt that this is the true surgery of profuse hæmaturia from ruptured kidney, for such a procedure anticipates these complications. The necessity for the *early* performance of the two operations in certain cases is well exemplified in a case which is reported by Mr. Rawdon, of Liverpool.* A boy aged twelve, suffering from ruptured kidney, began to develop symptoms of acute cystitis, and the injured kidney was removed by lumbar nephrectomy in order to prevent the blood entering the bladder. The acute cystitis continued, and lateral cystotomy was performed four days after the nephrectomy—the twenty-first day after the injury. Death took place, however, on the fortieth day from left pyelo-nephritis, due to the extension upwards from the vesical focus of septic inflammation.

Hence in ruptured kidney you may be face to face with the effects of acute renal hæmorrhage, which may clot in the bladder and induce fatal septic complications. When the clots are small, and can be evacuated by the bladder without difficulty or much distress, you had better not interfere. Even avoid catheterism, for unless you are very careful you may induce the cystitis which you are desirous to avert. If the blood-clots are too massy for expulsion, and pain and ineffectual straining are caused by their presence, introduce a large-sized catheter and attempt to suck out the clot by means of a strong syringe. A Bigelow's calculus evacuator is the most convenient form of apparatus, but this you may not have by you. If you are unable to suck out the clot, inject a few ounces of boracic solution, 4 per cent., and move the beak of the catheter carefully to and fro in the bladder, so as to break up the clot. A lithotrite opened and closed several times in the

* 'Lancet,' May 26th, 1883.

bladder, taking extreme care not to bruise the walls between the jaws, will cut the clot into small clumps, and these you may be able to remove by suction. The transit of the clot is aided by oiling the *interior* of the cannula or catheter. Failing this manœuvre being successful, it is wiser to perform a perinæal section, the old-fashioned boutonnière operation.* The clot may now be broken up by means of the finger, aided by the other hand pressing on the bladder above the pubes; or it may be removed with lithotomy scoop or small lithotomy forceps. I prefer to use Watson's ebonite drainage-tube of large size (Fig. 3), which I pass into the bladder and then affix a large brass syringe. The clot and urine are then sucked out into the barrel of the syringe, which is emptied and applied again, or it is filled with boracic solution (4 per cent.) to inject into the bladder, and break up the clot before again applying suction. By repeating this several times the bladder is emptied. It is then thoroughly disinfected by throwing in several syringefuls of perchloride of mercury solution, 1 in 8000 to 1 in 10,000. Finally, a large elastic drain-tube, Jacques, No. 18 to 24, English gauge, is inserted and kept in position by piercing its perinæal end transversely with two long safety pins. These latter are kept off the wound by a simple dressing of wet gauze, and pinned to a T bandage.

Even perinæal drainage will not arrest the invading progress of the inflammation in severe crushes of the kidney, for nothing short of a free incision into the loin, and removal of the decomposing clot and pulpy renal tissue will avail.

In slighter cases you may rely upon absolute rest, application of cold, free exhibition of opium and ergot in the earlier stages, and opium and salol when the hæmorrhage has subsided.

(ii) *Ruptured bladder*.—In both varieties, the intra-peri-

* *Memo*.—Patient being in lithotomy position, pass a well-curved staff with a deep median groove. Enter long straight bistoury, three quarters of an inch above anus, back of knife being downwards, and make vertical incision upwards about an inch in length. Place left forefinger in wound, feel for groove in staff, and run knife into groove, keeping back downwards; cut upwards half an inch, laying the membranous urethra open to this amount; lightly rotate blade point in the groove until its back is now upward, then incise downwards, traversing the former cut without pressure before incising half an inch downwards, keeping the knife parallel with upper border of bowel. Take Teale's blunt gorget in right hand, slide point along the knife till it drops into the groove of the staff. Withdraw knife. Take staff in left hand, and as you depress the handle between legs, slide gorget on the groove into the bladder; as the gorget enters there will be a rush of water and clot. Withdraw staff. Insinuate right forefinger along concavity of gorget until you feel it in the bladder. Withdraw gorget.

FIG. 3.



toneal and the extra-peritoneal, the treatment of the hæmaturia is the treatment of the injury. It must be prompt and bold.

(B) *Intra-peritoneal Rupture.*

After a violent succussion of the body, or a blow upon a full bladder, a laceration or rent may extend through the entire thickness of posterior wall, and the contents of the viscus may pour into the peritoneal cavity. The patient generally loses the power of passing water, and is tormented with an urgent desire to do so. The medical attendant introduces the catheter and usually draws off blood, or a variable amount of blood and urine, or fails to evacuate anything. The utmost that will be withdrawn will be four to six ounces, though it may be certain that the bladder was full at the time of the accident. The flow of this urine from the catheter is characteristic. It does not run out of the mouth of the instrument, but wells out, or drops out *guttatim*, or leaks away between the meatus and the catheter. When the rent in the bladder is large the eye of the catheter may pass into the peritoneal cavity, and draw off an enormous amount of blood and urine (in Mr. Poland's case this was three quarts). The rupture must be verified by the injection into the bladder of boiled water.* If a large quantity, fourteen ounces, can be introduced without resistance, and without the appearance of the bladder above the pubes, the peritoneum must be opened, the cavity washed out, all blood-clot removed,† and the wound in the bladder stitched by a series of Lembert's sutures,‡ passed close together through the peritoneal and

* Dr. Morton of Philadelphia suggests hydrogen gas insufflation, cf. Appendix K.

† The amount of blood found in the peritoneal cavity after these injuries is remarkable, *e.g.* 3 lbs. (Dr. Dewar's case), three or four pints of nearly pure unoeculated blood (Mr. B. Cooper's case).

‡ *Memo.*—The following manœuvres facilitate the stitching :

- (1) Petersen's bag in rectum, to fix and raise bladder base.
- (2) The Trendelenberg position—hips and legs elevated high above the body, cf. Treatment of Pyelitis.
- (3) The *transverse* incision, cutting through both recti muscles, partially or completely, restitching subsequently, if the median incision is insufficient.
- (4) Keeping back all intestines by means of flat sponges.
- (5) Hooking up nearer end of rent by means of a button-hook retractor.
- (6) Using fine silk for suturing, commencing in healthy tissue beyond either end of rent.
- (7) Distending cavity of bladder before closing abdominal wound, in order to see if the rent be securely repaired.
- (8) Draining bladder for twenty-four hours by catheter in urethra, or draining fully by perineal section, according to gravity of case and your reliance on your stitches.

muscular wall, but not including the mucous membrane. The mortality on 27 cases was 62·9 per cent. (Morton).

Extra-peritoneal rupture.—When the bladder is ruptured outside the peritoneum the patient is said to retain the power of passing urine, and usually the hæmorrhage from the rupture which mixes with the secretion is free and persistent. This was certainly so in five out of the six cases which have been under my observation.* The general symptoms are more subdued, but as sooner or later septicæmia results, it is better to check the hæmaturia and inflammation by an early supra-pubic opening. Many lives will be saved by this means. The best example I can give you was under the care of Dr. Walker at the Bootle Hospital, Liverpool.†

The patient was a fireman of a steamship, æt. 40, who went to bed in his usual good health, and woke suddenly between one and two o'clock in the morning, wanting to pass urine, and complaining of intense pain all over "the privates." A medical man who was summoned passed a No. 8 gum-elastic catheter, and drew off blood in considerable quantity. Early in the morning the patient was admitted into the hospital. His abdomen was distended, dull on percussion, and very tender over the bladder. The perinæum was ecchymosed. During the day he passed about thirty ounces of blood. After the diagnosis of rupture of the bladder had been made, the treatment consisted in the retention of an india-rubber catheter and ablution of the bladder with weak carbolic lotion (1 in 100). An erythematous rash characteristic of extravasation began to appear over the right iliac region, extending halfway down the thigh. Vomiting set in, and great prostration, and the patient died on the fourth day after the rupture. There was a cavity about the size of an orange behind the symphysis pubis, filled with blood-clots. A rupture was found two inches in length in the anterior wall, commencing an inch from the neck, and extending to two inches from the apex. The urethra was normal. There was nothing whatever to account for the rupture, the patient averring that he had always been a temperate man, free from venereal diseases, and had not sustained any injury prior to the rupture. Mr. Harrison, who saw the case in consultation, thinks it probable that the rupture was really due to an injury which escaped notice. The character of the rent, the quantity of blood effused into the pelvic areolar tissue and in the rectus muscle, and the ecchymosis of the perinæum, point to injury rather than to spontaneous rupture. A supra-pubic exploratory incision made immediately after diagnosis would have afforded the patient the best chance of recovery.

RUPTURE OF THE URETHRA.

The hæmorrhage from the meatus which follows a kick or contusion of the perinæum is profuse in proportion to the severity of the laceration of the urethra. The rupture is usually situ-

* Cf. author, 'Pathol. Trans.,' 1886, vol. xxxvii, p. 303.

† 'Brit. Med. Journal,' 1882, Dec. 16th, p. 1207, quoted by Rivington, 'Ruptures of the Urinary Bladder,' p. 87.

ated in front of the triangular ligament, or involves the anterior layer of that fascia. A full-sized black elastic catheter should be gently passed, and if it enter the bladder easily and without a hitch, and the blow and the hæmorrhage have been very slight, it may be withdrawn.

If the hæmorrhage has been smart and the blow severe, the catheter should be left in the bladder for twenty-four hours, if it can be introduced.

If the catheter cannot be passed, a staff should be introduced as far down as the rupture, and a median incision made in order to allow of the extravasated blood and urine escaping. I prefer to place a tube through the perinæal wound into the bladder, in order to obtain and to keep up free drainage from the lacerated parts.

Hæmorrhage from the Urethra after Instrumentation.

False passages are much more easily and more often made by non-metallic instruments than is generally supposed. I cannot but believe that we are sometimes tempted to use unnecessary violence on the plea that no damage can be done by the black elastic catheters, bougies, or whips. Often as not, the mucous membrane in front of a semi-cartilaginous stricture is softened and spongy from chronic inflammation, and the point of a black bougie or guide is buried in it without much pressure being exerted. Usually the orifice of the false passage is on the floor of the urethra, and the hæmorrhage resulting from it may be quite profuse; but in certain congested urethræ the slightest touch with a bougie is followed by a smart hæmorrhage. In treating cases in which such a hæmorrhage has taken place nothing need be done locally. I have seen false passages with the new urethroscope a few hours after the infliction of the injury occluded with blood-clot, and have known them heal very quickly, although the patient has assured me he had been deluged with blood at the time, and no attempt had been made to check the hæmorrhage. If bleeding is unusually profuse, put the patient flat on his back on the ground, and raise his legs on a chair for ten minutes. This is quite sufficient. Never use iron as an injection. Some of you may remember a patient who was sent in with retention due to the folly of a quack, who had injected strong solution of perchloride of iron down the urethra in order to check a hæmorrhage arising from a false passage.

The urethral canal of that poor wretch was indescribable, and the damage permanent and irremediable.

Hæmaturia after Internal Urethrotomy.

You have often seen the operation of internal urethrotomy performed; and its low mortality, its simplicity, the ease with which the stricture, is divided, and the astonishing relief this affords to those suffering locally and generally from the effects of a tight stricture, have very naturally impressed you. I know, as house surgeons, that you are permitted to do this operation under the direction of your surgeon; and I am also well aware that, with some, it is made light of. The subject of the treatment of traumatic hæmaturia which is now before us permits me to give you a very earnest warning against recklessly using the Maisonneuve urethrotome—that which severs the stricture on the upper wall—in the deep urethra; and to advise you before you permit yourself to despise this operation to consider the following statements.

Alarming bleeding may result from the division of a stricture in any part of the canal, but nowhere is it more profuse or under less control than when the section has involved the *upper wall* of the *deep* or *membranous urethra*. This method of division is effected by a Maisonneuve urethrotome. Should the cutting blade be over-large, the stricture recent, or the handle of the instrument depressed too much, the dorsal vein of the penis, as it curves beneath the pubic arch or the plexus of Santorini, placed more posteriorly, may be wounded.

As the dorsal vein and Santorini plexus divide and subdivide into the large bilateral venous trunks which clothe the sides and base of the prostate and bladder, and as these, passing backwards, pour their blood into the internal iliac veins, the entire pelvic venous system may be suddenly depleted by one unlucky sweep of a misdirected blade.

A passing reference to the anatomy of the parts will accentuate the above statement.*

Plate I, fig. 1, taken from Professor Braune's work on frozen sections,† shows the relation of this large dorsal vein and plexus of Santorini to the upper wall of the membranous urethra and the pubic bone. Plate II, fig. 2, will not only convey to you some idea of the volume of venous blood which lies reservoired within the vesico-prostatic plexus, but

* Author, 'Illustrated Med. News,' Nov. 3rd, 1888, p. 121.

† Braune, 'Topographisch Anatomischer Atlas,' Tab. i, B., 1872, Leipzig.



also a realisation of the danger of cutting the sluice-like dorsal vein which is the entrance to it. The picture is taken from Lenhossek,* and represents the under surface of the dissected venous meshes, the vesico-prostatic (A), which pass from the pubic arch to the internal iliac veins. It might be very fairly contended that if the dorsal vein was opened by the knife a natural safeguard in the shape of lock-like valves exists within these veins, which would oppose the outward rush of venous blood. I have shown† that valves exist in youth and health at definite points along these trunks, and that a very strong pair guard the opening of the plexus into the iliac veins.

The former often suffer from inflammation, being near the bladder neck, and the valves get warped and inefficient; the veins themselves increase in number, and are often varicosed. But the latter group—those guarding the exit, which prevent this pelvic system from bearing any of the abdominal venous pressure—are rarely rendered useless by disease. Hence it is that although the chief plexus of the pelvis may be thoroughly drained of its contents through the impotence of its central valves, yet the loss extends no further, for the vesico-prostatic exit valves are tough and strong, and prevent the venous column in the valveless iliac and lower caval veins from breaking through them.

I have now seen three deaths—not in my own practice, I am thankful to say—from severe hæmorrhage after a deep-lying stricture had been divided by an upper cutting urethrotome. In each of these three cases I was asked by the surgeon of the case to make a careful post-mortem dissection in order to ascertain the cause of death. In each the same fatal lesion of the dorsal vein, and of the plexus immediately behind it, was readily demonstrated.

CASE 25.—Eight years ago I was asked by a surgeon, who is now practising in the country, to examine the body of a patient upon whom internal urethrotomy had been performed, but who had died shortly after from profuse urethral hæmorrhage. The following details were given me:—"S. T—, of middle age; stricture at $6\frac{1}{2}$ to 7 inches, of eight months' standing; a small bougie only admitted; no anæsthetic was administered. A urethrotome of the Maisonneuve pattern (cutting on the roof) was passed, and the stricture divided. There was no hitch whatever in the slight operation, but on withdrawing the instrument a spurt of bright arterial blood issued from the penis. A No. 12 silver catheter was at once passed, and the blood poured

* Lenhossek, 'Das Venöse Convolut der Beckenhöhle beim Manne, Tab. ii, 1871.

† Author, 'Journal of Anatomy and Physiology,' p. 320, 1885.

pulsating from it. Pressure upon the perinæum and upon the course of the internal pudic arteries apparently checked the bleeding, but we now have reason to believe it only prevented its outward course, and forced it to enter and distend the bladder; for at the end of an hour that viscus could be felt and seen as a small globular mass, reaching just above the pubes. The patient was now exsanguine and almost pulseless. After a hurried consultation, we decided to open the membranous urethra on a grooved staff. This was done. On inserting the finger into the opened urethra a slit could be felt in its upper wall. This was evidently the track of the urethrotome. It stopped abruptly at the opening of the prostatic urethra. The bladder was full of clot; this was removed, a lithotomy tube passed, and the wound stuffed with cotton wool soaked in a solution of sulphate of iron. The hæmorrhage was thus checked, but the patient was quite livid. He never recovered from the profound collapse into which he had fallen, but died thirty-two hours after." I made the following notes of the autopsy:

Scrotum considerably ecchymosed and œdematous. The rectum, bladder, and urethra as far as the glans penis, with the pubic arch attached, were carefully removed. The condition of the other organs called for no remark, being bloodless, but perfectly healthy.

The rectum was dissected off, and the bladder and urethra laid upon their front and roof, and opened from behind by a longitudinal incision (Plate II, fig. 3), so as not to interfere with the internal urethrotomy wound. The bladder (B) was hypertrophied, and full of dark, clotted blood. The mucous membrane, stained of a senna brown, was curiously wrinkled by contraction, but quite healthy. The urethra was similarly stained. At the spot where the canal bends beneath the pubic arch—that is, the roof of the membranous urethra—a deep and sloughy, blood-stained slit was seen (A), which had divided all the tissues between the upper wall of that tube and the subpubic ligament. The contrast between the oval sections of the brick-red bulb, the russet-brown urethra, with this purple ragged median slit, formed a very striking picture, which was unfortunately quickly spoilt by rapid decomposition. On closer examination it was evident that the dorsal vein of the penis and the tip or apex of the cone-shaped Santoriui plexus had been completely severed.

Without touching the specimen further, I proceeded to inject the internal iliac veins, clamping the various cut orifices so as to direct the stream of coloured fluid into the vesico-prostatic plexus. The valves at the very entrance (vesico-prostatic exit valves) were healthy, and had to be pierced with the point of the cannula before any further injection could be made. Directly the current entered the plexus, however, it streamed towards the pubic arch, and forcing out a few small clots, which closed the openings of the urethrotome-divided veins, it poured out into the urethra—a practical demonstration of the site and supply of the fatal hæmorrhage.

A record of the autopsies of the other two patients which I mentioned as having made at the request of the medical men in charge are superfluous. They proved to be exactly similar to the case I have related to you. I cannot tell you the cause of the mischance. It is remarkable that one at least of the three fatal cases had been cut without an anæsthetic, and the surgeon who operated in this instance suggested that the involuntary spasm of the constrictor muscle had brought the

superjacent veins, already adherent by inflammatory change to the upper section of the tube, within the sweep of the blade. It is noticeable that each of these three patients was highly excitable and apprehensive.

Being aware of the dangers, I have always been especially careful of driving the knife through these deep strictures, but not long ago, in performing internal urethrotomy upon a private patient, I severed the dorsal vein in exactly the same manner.

CASE 25.—The patient, who had had internal urethrotomy performed twice before, was of a nervous anxious temperament. I injected cocaine, and followed it with a Berkeley Hill urethrotome shield, and divided three strictures, one lying well under the pubic curve. On withdrawing the instrument it was followed by a decided spurt of venous blood, such as I had never seen previously, though my experience of the operation is fairly large (70). Pressure on the perinæum stopped the hæmorrhage, and I determined to wait and watch events. The bleeding recurred and became alarming. I therefore had the patient chloroformed and did perinæal section on a grooved staff. On withdrawing the staff, the point of my finger impinged upon a clean cut in the upper wall of the membranous urethra, and on my shifting the point slightly, a copious and tap-like rush of blood shot out of the perinæal incision. There was no doubt I had divided the dorsal vein. I found, to my satisfaction, that pressure exerted forwards on the pre-urethral part of the prostate by means of the forefinger in the prostatic canal checked the hæmorrhage. I therefore passed a very thick unyielding lithotomy tube into the bladder, and packed small sponges behind it to keep up pressure in this direction. The perinæum was now piled with sponges around the tube, so as to force up the floor of the urethra, and the whole was secured by a broad rib bandage, with a hole in it through which the opening of the tube passed, the ends of the bandage being secured to the patient's braces, which passed over the shoulders.* A small handful of wool under the brace divisions, as they crossed the clavicle, prevented injurious pressure. I was anxious for the next two or three days, but the hæmorrhage did not recur, and I removed the pressure dressings on the second day. My patient recovered completely.

Should it ever happen to you to meet with a similar mishap I recommend the treatment I adopted in this case. Probably it would be simpler to guide a pair of Spencer Wells forceps to the point of the finger as it overlies the wounded veins, and to catch and compress their orifices. I attempted this, but found the tissue in which they lay was so infiltrated and softened that I chose the pressure plan in preference. The forceps could be left on for twenty-four hours, and a Jacques perinæal drain gently inserted into the bladder to carry the urine away from the wound.

* A suggestion of Mr. Swinford Edwards.

Moderate Urethral Hæmorrhage after Internal Urethrotomy.

In mentioning the foregoing danger I must warn you not to be precipitous in dealing with hæmorrhage after internal urethrotomy. There is always some bleeding after the operation; usually it is trifling. Should it be smart, and the pulse show itself in the stream of blood which issues from the meatus, it is most probably from the *deep* urethra. Do not, however, be content to jump to the conclusion that this section of the canal is always the site of brisk hæmorrhage, for a lacerated wound of any part of the penile urethra can furnish a stream of an arterial character. Put your forefinger just within the anus, on to the anterior wall of rectum in front of prostate. Does light upward pressure stop the bleeding? No. Then bury your forefingers in the perinæum, and direct them against the pubes. If the bleeding ceases you are correct in your surmise, and you can adapt a truss or sponge pressure directly on to the perinæum by braces brought over the shoulder. If the loss continues after the perineal search, apply the radial edges of the two forefingers to each side of the bulb, and watch the effect. If the bleeding shows no sign of abating, it most likely emanates from the penile urethra. Track it carefully to its source by *lateral* pressure. The bleeding will *increase* as long as you exert compression posterior to the wound, for you will thereby produce congestion by interfering with the venous current. Lateral pressure of any median wound is quite sufficient to arrest a moderate flow of blood. It is easily made by means of two pieces of lint-padded firewood kept approximated and in position by means of a bandage. In the penis it is especially easy to stop hæmorrhage from linear incisions by means of side-splinting, kept in position by a strip of strapping. If a meatotomy bleed very freely, a padded test-tube holder, a pair of dissecting forceps put over like a clothes-peg, and the ends lightly approximated by means of an india-rubber band, is all that is needed. *Faute de mieux*, an ordinary pince-nez astride two slips of match-box placed on each side of the organ, will suffice. The pressure must be relaxed when the patient wishes to make water, and a sharp watch kept at night to avoid recurrence during an erection.

Remember, then, that the difficulty in the correct treatment of moderate urethral hæmorrhage after internal urethrotomy

depends merely upon the fact that you do not know the exact site of the bleeding.*

You are usually taught to pass a full-sized metallic catheter, and to bind the penis firmly round it. Do not try this until you have failed with pressure, for the passage of a large instrument under these circumstances is not without danger or difficulty. The danger lies in hitching the point of the catheter into the softened sulcus left by the blade of the urethrotome, and in deepening the wound by attempting to force the instrument along the furrow into the bladder. The sulcus is sometimes very difficult to avoid, especially if previous attempts have been made, and the manœuvre in this case not only fails, but also tears open many softened vessels, to the great increase in the violence of the bleeding. Moreover, a large bougie merely keeps the edges of the wound apart, and favours rather than retards the hæmorrhage.

Continued Hæmaturia after Urethrotomy.

Should smoky or *dark-coloured* urine be passed after an internal urethrotomy it is probable that the hæmorrhage is behind the constrictor urethræ, and the site may either be posterior urethral or be a reflex hæmaturia from the bladder or kidney. If the pelvis is well elevated for a quarter of an hour at a time the urethral form of bleeding usually ceases.

* CASE 26.—As these pages were passing through the press the following mishap occurred to me, which vividly illustrates the dangers of neglecting the precaution of finding the site of the hæmorrhage.

I performed a meatotomy upwards upon a private patient for a stricture just within the meatus. All went well until the fourth day, when he passed, by my directions, a meatal bougie (24 F.) two inches long. He acknowledged subsequently that he used force, and felt the part give way. On withdrawing the plug a smart hæmorrhage shot out. He applied his fingers laterally, as I had instructed him in case of such an accident happening, and sent for a neighbouring medical man, who passed a silver catheter. The bleeding being uncontrolled he was despatched to a hospital, where the greatest trouble was taken to stop the hæmorrhage by means of passing a full-sized catheter and bandaging the penis tightly around it. The hæmorrhage recurred again and again under this treatment for the next two and a half days. So much blood was lost that the surgeon in charge believed I had performed deep internal urethrotomy. On the third day the catheter was withdrawn, and two small pieces of wood were applied laterally to the glans and secured by a thin strip of plaster. This checked the bleeding at once. The slips were removed when the patient wished to urinate, some little blood being lost on each occasion. On the fourth night, the bleeding having apparently ceased, the glans clip was left off, and the patient in his sleep, and during an erection (?), lost a quantity of blood before the hæmorrhage was discovered. He recovered, and I subsequently learnt that he always bled profusely on the slightest cut.

In dealing with urethral hæmorrhage you attempt, by means of drugs, to check any tendency to erection, to quiet the circulation, to control the hæmorrhage, and to soothe the nervous irritability and anxiety of the patient. The following is often of value :

R Potass. Bromidi, ʒiij.
 Liq. Opii Sedativ., mxl.
 Hazelini, ʒj.
 Glycer. Acid. Gallici, ʒiij.
 Tr. Cocci, ʒj.
 Aquæ Chloroformi, ad ʒviij.

M. Ft. Mist. Sig. Two tablespoonfuls to be taken thrice daily.

In the spontaneous form of urethral hæmorrhage, in which the blood is more venous in hue, a cold enema or a piece of ice in the rectum often checks it abruptly. Failing this, pressure of a twisted towel rolled up and pressed against the canal from the perinæum to the root of the penis is nearly always sufficient. Gallic acid and opium often act like a charm.

Treatment of the Hæmaturia of Disease.

I wish to put the following question and its answer before you. Is there any form of hæmaturia which it is better policy to leave unchecked? I believe that in hard carcinomata of the bladder, in engorged senile prostatic enlargement, and in renal hæmaturia the result of cardiac disease, the bleeding is, to a certain extent, beneficial. In hard carcinoma there is often a great increase of pain when the bleeding is arrested and a sensible diminution in the suffering when it has become re-established. In those congested prostates which bleed periodically I suspect—but I cannot place before you convincing evidence of this, that there is a tendency to atheromatous degeneration of the vessels, and the bleeding acts not only as a safety-valve, but serves to deplete an over-tense tissue. In renal hæmorrhage from obstructive mitral disease or granular kidney the high blood-pressure condition is often greatly relieved by a slight intermittent hæmaturia.

Be guided, therefore, by circumstances in these three diseases, and do not hastily check a hæmorrhage which may be affording your patient relief. At the same time, in dealing with old people and cardiac disease do not permit the hæmorrhage to become debilitating. We will now consider the appropriate treatment for hæmaturia in the various diseases we have just glanced at.

TABLE I.—*Symptomless Hæmaturia.*

*Carcinoma of the kidney** (p. 22).—*Operative.*—The statistics of Brodeur† and Guillet‡ show an immediate mortality of 56 per cent., and the final “cures” are only just encouraging enough to permit us to hope that, with an *early* diagnosis, we may achieve success in removing a renal carcinoma. I believe my own case (Case 2, p. 5) is the earliest on record, for nephrectomy was performed three months after the onset of symptoms, and before the kidney became enlarged. No case is at present, I believe, published in which the renal artery was tied to check hæmorrhage and growth, though there is no reason why this should not be attempted. The future of nephrectomy in renal carcinoma depends upon a diagnosis being made and acted upon very early in the disease; for the general feebleness of the patient and the intimate connections, either inflammatory or neoplastic, which the kidney acquires with surrounding structures, render the operation very hazardous in itself, whilst the generalisation which rapidly takes place in this disease causes operative interference to be hopeless, if it is not undertaken soon after the degeneration has commenced.

Dangers attending Vesical Exploration in Renal Cancer.

Under the heading of the operative treatment to check hæmaturia in renal cancer it would be best to draw your attention to the dangers of instrumental interference. I am certain that much harm is done in this as well as in other recent renal hæmorrhages by hasty and unwise catheterism, rough sounding, and septic or irritating irrigations of the bladder. I have known serious complications arise upon the practitioner exciting a slight cystitis by introducing astringents into the bladder, in the mistaken belief that he is dealing with a vesical and not a renal hæmorrhage. I have myself unfortunately been the cause of one mishap (Case 27), which, in the light of a more extended experience, I can now trace to a slight rigor inducing inflammatory changes in a broken-down, carcinomatous kidney. I have already published it,§ but consider it essential to again enforce the warning by repeating the case in detail.

* Renal sarcomata in children are inoperative.

† Brodeur, *Affection du Rein*, 1886, p. 143.

‡ La Dent, *Affections des Reins*, 1889, p. 559.

§ *Elect. Illust.*, 2nd edit., p. 208.

CASE 27.—A stout gentleman, æt. 50, was sent to me by Dr. McMullen in March, 1889, for cystoscopy in order to ascertain the cause of a severe intermittent hæmaturia of eight weeks' duration. The patient stated that one evening after a heavy meal he was stooping down, attempting to drag out a heavy lower drawer from his bureau, when he suddenly felt an intense desire to urinate, and he immediately passed a large quantity of bright fluid blood. He is not quite certain as to whether he felt something give way in his left side or not. On the next micturition the urine was quite clear. The hæmorrhage recurred fourteen days afterwards, finally becoming intermittent. The blood was always intimately mixed. No frequency, no pain.

On passing the cystoscope I noticed a very slight hitch at the urethral orifice which momentarily obstructed the passage of the instrument, but this yielded on the lightest pressure. "The bladder appeared quite healthy. The mucous membrane was smooth; the muscle was fasciculated. On the right side of the base was a small blood-clot adherent to the surface. I considered that the case was renal, but as no blood was flowing at the time, it was uncertain which side was affected." The patient had a rigor the same evening and fever, he began to suffer great pain to the right of the navel and in the left renal region. The blood ceased, the temperature fluctuated, he became uræmic, and died, evidently of suppurative nephritis, within three weeks.

I was not able at the time to define the lethal part played by the examination in this fatal case, for no autopsy was allowed. It appeared to me that the suppurative nephritis followed as a direct consequence upon the cystoscopy. I can safely assert that it was not the result of any operative lesion, for the instrument was swallowed easily enough by the urethra; the visual examination was finished in less than a minute, and no pain was caused. The first signal of alarm was the rigor twelve hours after. From what I saw of the patient subsequently, I believe that the damaged kidney had suppurated under the septic influence of urethral fever, and from my experience of other cases I now conclude that the kidney was carcinomatous.

CASE 28.—Not long ago I had an opportunity of watching the course of a somewhat similar case, which was under the care of a professional friend.

J. S—, æt. 60. Two months before death he thought he had caught cold in his kidneys because he suddenly passed bright blood. He was placed upon iron and ergot without improvement, and began to pass many worm-like clots. No renal colic, no tenderness on deep pressure in either renal region. Prostate enlarged antero-posteriorly and laterally. Under hazeline and rest the blood began to diminish, and in a week's time it had ceased. He then began to suffer pain in the left loin, and was unable to make water. A No. 12 English silver catheter was passed, and thirty ounces of dark-coloured urine and clots were evacuated. Retention continued and almost pure blood was passed. The bladder was washed out with hazeline and boracic acid.

The pain in the kidney now became very severe, the retention ceased, the temperature began to rise, then oscillate, and patient died three weeks after the vesical treatment was commenced. On post-mortem a large left kidney with scattered deposits of soft carcinoma were found, the unimplicated renal tissue being in a state of acute nephritis. The fellow-gland was also affected with inflammation.

I believe the starting-point in this case also was urethral fever or slight cystitis following on clot retention, the passage of a catheter, and the manipulation necessary to evacuate the clots, for fever appeared directly upon this complication, and the patient's condition changed at once and for the worse.

It is true that you may find yourselves sometimes *forced* to interfere in similar cases, but I would strongly advise you not to be too eager to relieve the straining which is the necessary accompaniment of clot retention. If from inquiries you learn that the bladder has proved itself well able to evacuate its contents before the onset of the trouble, it is wise to wait patiently for the vesical muscle to do its own work, and to rid the viscus of the clots. Subdue pain by means of opium and warm applications to the supra-pubic and perineal regions. (Compare Prostatic Atony, p. 82.)

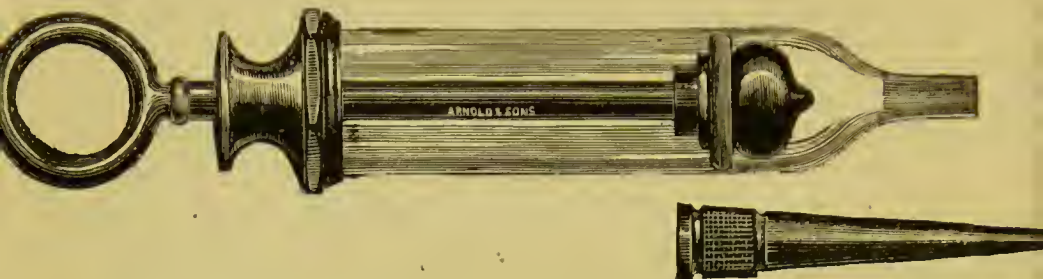
If clot retention and vesical colic is not spontaneously relieved within a few hours, and the patient is obviously made worse by waiting, then you must interfere. Pass a large-eyed soft catheter which has been syringed through with oil, and treat the clot in the way advised under the head of traumatic renal hæmaturia (p. 58). Only be most gentle, let your syringe, your catheter, and your solution be aseptic. Up to a few months ago most syringes, whether of brass or glass, were mere death-traps, and a source of constant anxiety and worry. I have now a syringe, however, which I can very confidently recommend to your notice for strictly aseptic vesical irrigation. It is made by Arnold, of Smithfield. Every part takes to pieces, and can be scrubbed, placed in hot water, alcohol, or some disinfectant solution, and without damage to the instrument. The piston is made of an ordinary umbrella ring (Fig. 4).

I may here allude to sterilisation of catheters; when they have been thoroughly syringed through and washed in Condly water you can affix them to a little catheter kettle,* made by Downs, of the Borough, and drive a jet of steam through them, after which they may be used without anxiety. For an aseptic solution used boiled water; for a lubricant pure

* Appendix N, "The Sterilisation of Catheters."

vaseline is perhaps the best of any, for "carbolic oil" is useless for aseptic purposes, and liable to irritate.

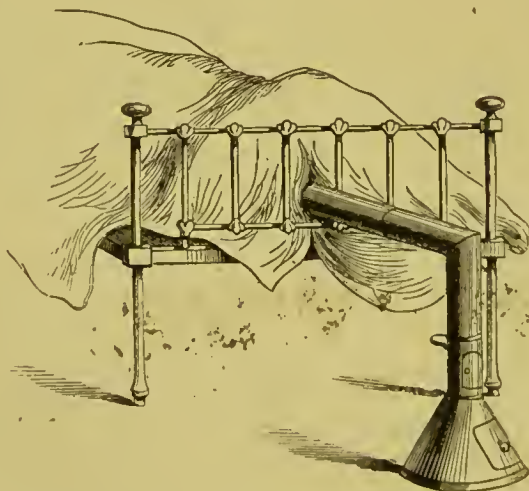
FIG. 4.



Rest, the application of cold, and the exhibition of any astringent will usually prove sufficient to check the hæmorrhage of a renal carcinoma in the earlier stages. Later on, the tumour itself may press upon the vessels and strangle the blood-supply, or the renal pelvis and ureter may become filled with clot which will render that canal permanently impervious. Generally the fluid extract of ergot or subcutaneous injection of ergotine, gr. $\frac{1}{4}$, acts well, but I have known perchloride or aluminate of iron succeed when other drugs have failed.

Chronic Bright's disease (p. 23).—The hæmaturia of granular kidney is, I believe, best treated by absolute rest in

FIG. 5.



bed, and a strict diet of milk. If the hæmorrhage is not excessive, and the patient is able to get about, Turkish baths may be taken with benefit. But if the hæmorrhage has

proved obstinate or profuse, it is better that the bed should be kept and a hot-air bath administered by means of a cradle and a spirit lamp.

The most convenient form is that figured above (Fig. 5). The air is heated in a receiver by means of a spirit lamp, and is conveyed under the bedclothes, which are supported over the patient by means of an iron cradle.* In this way you lessen the activity of the kidney by acting on the skin. At the same time you may administer the following mixture with benefit :

R. Tr. Digitalis, ʒj.
Hazeline, ʒss.†
Ext. Glycyrrhizæ liquidæ, ʒj.
Aquæ Destillat., ad ʒviij. M.
Ft. mist. ʒj t. d. s.

Avoid stimulating diuretics, such as juniper, turpentine, cantharides, copaiba, santal, cubebs. The bowels had better be acted upon very gently, or by means of rectal enemata of soap and water or glycerine.

1 a.—The renal hæmaturia in syphilitics (p. 25) may be combated by ordinary routine treatment, adding to your mixture the compound decoction of sarsaparilla and the extract of Hamamelis Virginica.

1 a.—The hæmaturia occurring in cardiac disease (p. 26), and the acute nephritis grafted on a disease affected with chronic Bright's disease, must be treated on general principles.

1 b. *Vesical growth* (p. 27).—*Operative interference*.—An incomplete ablation, even the surface removal of a growth,

* If a vapour bath is unobtainable, "it is a good plan to let the patient enter the hot bath at about 98° or 100°, and then add more hot water so as gradually to raise the heat to such a temperature as he can conveniently bear for a quarter of an hour. As soon as he is removed from the bath let him be packed in hot blankets for one or two hours, so as to encourage the sweating, after which he should be well dried and placed in a warm bed. In the vapour bath he is surrounded with blankets, and the steam is conveyed beneath them by a pipe connected with a boiler. In the houses of the poor an easy method of giving a vapour bath consists in placing the patient on a cane-bottomed chair and covering him with blankets, which are firmly secured around his neck. A small tub of hot water is placed at his feet, into which a heated brick is dropped from time to time, so as to keep up the evolution of steam. Some employ a hot bath produced by soda-water bottles filled with boiling water, wrapped in flannels, and placed near the patient when in bed; whilst others recommend that a couple of bricks should be put in an oven for half an hour, and then surrounded by thick flannels soaked in vinegar, and supported by plates placed close to the patient's shoulder on one side and his leg on the other (Dr S. Fenwick, 'Outlines of Medical Treatment,' 3rd ed., p. 304.

† Or Tinct. Hamamelis Virginica, ʒss.

whether benign or malignant, generally suffices to check the hæmorrhage for some months. The surgeon and the patient are thus often deluded into believing that the operation has been thorough and the cure complete. Effectual control of the bleeding can be obtained by perinæal or supra-pubic drainage, the bladder contracting upon the tube and diminishing the vascular supply of the tumour, or by drawing off all the urine for two or three days by means of a Jacques catheter. In benign growths, of course, the sooner a *thorough* operation is performed the better.* In pedicled carcinomata or sessile carcinomata of the mucous membrane which have not yet invaded the subjacent tissues no time must be lost if the operation is to be of use, and in such cases I would certainly recommend the adoption of supra-pubic cystotomy and free removal, for this will alone afford the patient a chance of lengthened life, if not of cure.

I wish you to consider two very important questions. Given a carcinomatous tumour of the bladder which has invaded the deeper structures, as evidenced by rectal examination, and which is producing free and debilitating hæmorrhage, is it wise to perform drainage in order to check the loss of blood? If the bladder has not yet become inflamed, and dysuria and pain are not experienced, I should advise that no such operation be performed.

1st. Because it will induce cystitis.

2nd. It will probably arrest the hæmorrhage permanently, and the bleeding is, I am sure, favorable to a carcinomatous patient by reducing his pain and permitting him to ebb easily out of life.

3rd. It will weaken the bladder at the site of the operation wound, and the scar, whether supra-pubic or perinæal, will subsequently become implicated. You will therefore only add by untimely drainage a noisome and painful surface to a sufficiently fetid and agonising disease.

Instead of operation I should advise the passage of a soft Jacques' catheter, and the slow withdrawal of the urine for two or three days until the hæmorrhage has diminished in violence. The hæmorrhage usually subsides upon the onset of the stage of cystitis.

* This is not the place to discuss operation, so I merely mention that statistics are very favorable. I have operated upon sixteen cases (6, 16, 28, 35, Appendix C; 1, 2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 15, Appendix E). All are alive and well except 6 C, who died of recurrence, and 9 and 10 E, whom I lost from suppression in the influenza epidemics of January, 1890 and 1892. Both patients were suffering from a recent attack unknown to me at the time of operating.

The next question to be asked and answered is—If cystitis, pain, and dysuria be present to an extreme degree, and the hæmorrhage is profuse, should drainage be adopted? By all means. A perineal drain if the growth be on the posterior or superior wall, or a supra-pubic drain if the tumour is situated on the floor or around the neck, will generally suffice to arrest the hæmorrhage; and it is certainly indicated under the conditions met with in the *later* stages of vesical carcinoma. But do not misunderstand me; such an operation is usually the beginning of the end, and it is, moreover, not *certain* to relieve the pain, nor (*vide* lecture on Pain) the agonising cramp-like contractions of the vesical walls. You cannot promise relief from the pain in the infiltrating type by this procedure, but you may do so in the softer forms of surface epithelioma.

Dangers of sounding.—It is obvious, in cases where a soft and easily lacerable growth is present in the bladder, that the slightest touch in sounding will cause more or less hæmorrhage. In the hard epitheliomatous ulcer this does not happen, but in all the softer forms, and in the infiltrating type with surface cystitis, the hæmorrhage after sounding is often very troublesome to the practitioner and alarming to the patient. It is as well, therefore, in symptomless hæmaturia to be most gentle, and to warn the patient beforehand that such may happen, but that the occurrence is of diagnostic value.

The hæmorrhage after removal.—If, after the ablation of a tumour, a brisk hæmorrhage continues for more than a few hours, it should be dealt with promptly. You may weakly argue that the patient is habituated to the loss of blood, and will therefore bear depletion better than another. Do not allow of such Fabian policy. The renal system is the dangerous factor you have to deal with in such cases; if it is greatly deprived of blood by the reduction of the general vascular pressure, the kidneys are very liable, in the face of shock or reflex nervous influence from an operation wound, to strike work altogether. There are various expedients advised to prevent the bleeding.

Sir Henry Thompson says, "A solution of perchloride of iron may tend to check the hæmorrhage which is almost invariably very free for a few hours after the removal of a wide-based growth, and it may partially destroy the portion which remains after the forceps have done their work. For this purpose I have contrived a straight and also a curved glass syringe containing a small sponge saturated with the solution.

The sponge being pressed by the piston permits the escape through small perforations at the extremity of from 30 to 60 minims of the solution, at the precise spot where it is desired to make the application.”* I cannot say I have ever had free hæmorrhage after the operation, but then I usually prefer to operate through the supra-pubic wound, in which case the base of the growth is under my eye, and I take care that hæmorrhage is practically checked before the patient leaves the table. In one female case I had to encounter a very long-continued hæmorrhage after removing a broad-based growth, and was forced to place the patient under an anæsthetic, and to apply a matico swab to the wound through a large cannula, being guided to the exact spot by the electric cystoscope. This, with repeated douches of hot water, sufficed. You can, however, rely upon hazeline, pure or mixed with equal parts of hot water, injected through the drain-tube, and allowed to remain in the bladder for five minutes. This will usually check any hæmorrhage, unless it be from a dangerous wound of the muscle wall. In which case it is wiser to reopen the wound, to insert and to direct a small Ferguson’s vaginal speculum† on to the spot whence the tumour was removed, and to apply with a little pressure a solution of iron on cotton wool or a small sponge on to the bleeding point; taking care that the surplus solution is soaked up, and is not allowed to flow over the adjoining mucous membrane.

Drugs.—I cannot give you any drug you can implicitly rely upon to check a well-established hæmorrhage from vesical growth, whether benign or malignant. I know of none. Any or no drug will suffice in the very early stages, gallic acid and opium being, perhaps, as good as any. You may try every hæmostatic, and may chance upon one which suits your patient and holds the loss in check. Should at any time the bleeding become alarming, much good can be done by intravesical injections. I know of few more certain than hot hazeline, or hot hazeline and water. Prout‡ recommends that twenty to forty grains of alum, dissolved in a pint of water, should be injected into the bladder. He says, “This remedy seldom fails to check the bleeding, even when the cause is malignant disease. I have never known any unpleasant consequences follow the use of this expedient, and have seen it immediately arrest the most formidable hæmor-

* Sir Henry Thompson, ‘Tumours of the Urinary Bladder,’ p. 84.

† Cf. author, “Caisson Work in Bladder Surgery,” ‘Brit. Med. Journ.,’ 1892.

‡ Prout, ‘Stomach and Renal Diseases,’ p. 421, 5th ed.

rhage when all other means had failed, and when the bladder had repeatedly become again distended with blood almost immediately after its removal."

Sir Henry Thompson* has great confidence in astringent injections thrown into the bladder with great gentleness, and through a small soft catheter. The two which he uses for cases in which operation has not as yet been decided on, and especially for those in which the tumour has been only partially removed, are perchloride of iron and nitrate of silver. "The strength employed is from twenty to sixty minims of the tincture of the perchloride of iron in four ounces of cold water, to be used daily once or twice according to circumstances; of the nitrate of silver from gr. j to gr. vj in four ounces of water, the stronger solutions being rarely tolerated or necessary."

One word of caution in reference to injecting astringents into the bladder to arrest neoplastic hæmorrhage. It will not be productive of immediate danger, as in renal cancer, but, if performed in a slovenly septic way, it is quite capable of curtailing the life of the patient, and of adding unnecessarily to his many sufferings. Cystitis is the turning-point in the life of a malignant vesical tumour. After inflammation has been *induced*, or upon its appearance, there is an immediate increase in the pabulum of blood which is conveyed to the malignant mass to be utilised in its construction. All the misery and pain caused by irritative cystitis and the necrosis of the surface of the tumour is, therefore, summoned weeks or months before it otherwise would appear if the disease were permitted to take its course.

2. THE TREATMENT OF HÆMATURIA WITH CO-EXISTING SYMPTOMS.

(A) *Renal Symptoms co-existing with Hæmaturia.*

(i a) *Primary renal tuberculosis* (p. 32).—The hæmorrhage is rarely of much moment, and the treatment is the same as that which is usually directed against inflammation or ulceration of the genito-urinary mucous membrane. Of drugs, the oil of sandal-wood is the best. It is taken in capsules of five, cautiously increased to fifteen minims thrice a day after food. If the renal pain is aggravated by its use, the balsamic oil had better be at once replaced by a less stimulating drug,

* Sir H. Thompson, *ibid.*, p. 72.

such as a mixture of citrate of potash, boric acid, and ammoniac benzoate. In all cases small doses of opium are of value, and later on the orthodox cod-liver oil. The patient should be sent for change of air, and have a liberal and fatty diet. Change to sea-side for town dwellers and to an inland dry climate for those living on the seaboard is usually in itself sufficient to hold the hæmorrhage in abeyance. (Compare chapter on Frequency of Micturition, Sect. V.)

(i b) *Stone in the kidney* (p. 33).—The appropriate treatment must be varied slightly according to the character of the urinary deposit. If the microscope or the eye detect a uratic condition of urine, moderate rest, a spare diet, avoidance of all alcohol, and the free use of alkaline waters, such as Contrexville, Khronenquelle, will usually suffice to check any tendency to hæmaturia. The bowels had better be regulated by a dose of phosphate of sodium (two teaspoonfuls) well diluted with water each morning. If the alkaline waters cannot be obtained, a teaspoonful of effervescing citrate of potash in half a tumblerful of water may be taken, or a very useful sherbet can be thus made :

℞ Potass. Citratis, gr. xv.
Lithiæ Citratis, gr. iv.
Sodæ Biboratis, gr. x.
Sacchari Alb., ad ʒj.
Ess. Limonis, mss.

M. Ft. pulv. siceat. mitte ʒiv.

Keep in a glass-stoppered bottle. A teaspoonful to be taken in a tumblerful of Salutaris water twice a day.

Or the boracite of magnesia* may be taken twice or thrice daily in teaspoonful doses dissolved in a tumbler of warm water.

Hæmorrhage in oxaluria and oxalate of lime calculus is perhaps more difficult to arrest. No brusque movements should be allowed ; the diet must be stricter, and free from sugar in any form ; all uncooked fruits ought to be avoided. Usually the acids in some bitter infusion succeed best. The following is valuable :

℞ Acid. Nitro-hydrochlor. dil., mxl.
Infus. Rosæ Acid. ad ʒviii. M. ft. Mist.
Sig. Two tablespoonfuls between meals thrice a day.

* Reginald Harrison ('Clinical Lectures at St. Peter's Hospital') says, "My attention was first called to the value of boracite of magnesia by Dr. Koehler, of Kosten ('Berl. klin. Wochen.,' Nov. 3rd, 1879), who advocated its employment in cases of uric acid calculi and gravel. It is prepared (Bell and Co.) by dissolving a natural borate of magnesia which is found at Strassfurt in citric acid, and it is given in teaspoonful doses in a tumbler of warm water two or three times a day."

The acids are also indicated when the urine is alkaline, and when it is probable that phosphatic calculi are present in the kidney. I have usually found the bleeding abate on the exhibition of the citro-borate of magnesia, or after a combination of boric acid and benzoate of soda with infusion of chiretta or serpentary has been taken for a few days. If there is pus with the urine the balsamic drugs are of value when taken at night after supper:—turpentine, five drops in capsule; copaiba oil, ten drops; sandal oil, ten drops, cautiously increased. The diet must be liberal and varied, and some form of stimulant should be added.

Operative treatment.—The attack of bleeding for which you have been consulted having been subdued, you will do well to place the probable progress of the disorder clearly before your patient, and to advise him strongly to undergo a careful course of treatment favouring the expulsion of the calculus, and, failing this, to submit to nephrolithotomy.*

Morrist and Newman have conclusively shown that the operation of lumbar nephrolithotomy in non-suppurative cases is practically devoid of danger (forty-two without a death).† On the other hand, when operative treatment has been delayed until suppurative disease of the kidney has been induced, the mortality was considerable (39, 6 per cent.).‡

Mr. Lawson Tait§ records forty-eight cases of nephrolithotomy with one death (2 per cent. mortality), and the general consensus of opinion is in accord with Prof. Keyes, of New York,|| who asserts that the posterior exploratory incision upon a kidney suspected to contain stone is devoid of any serious danger when performed with proper care; and that it should be resorted to more often than is at this date sanctioned by general surgical opinion.

* *Memo.*—*What symptoms justify nephrolithotomy?* Mr. Jacobson ('Brit. Med. Journ.,' vol. i, p. 117), 1890, sums up as follows:—(1) *Hæmaturia* (which in rare instances is absent) is recurrent, long-continued, rarely profuse, dependent on exercise. The blood is always intimately mixed with the urine; (2) *Pain*: (a) fixed lumbar pain of a dull aching character, increased by exercise, and often subject to nocturnal exacerbations due to flatus (Morris) or urine concentration; (b) radiating pain into testes, thigh, calf, and foot; (c) tenderness on deep palpation, and stabbing pain on percussion of kidney (Jordan Lloyd); (3) long-continued lithiasis or oxaluria, history of gravel, attacks of renal colic; (4) frequency of micturition, relieved by rest in bed, and not experienced at night; (5) absence of any condition like tubercular deposits in the prostate vesiculæ seminales, &c., which will explain the symptoms (H. Morris).

† Morris, 'Surgical Diseases of the Kidney.'

‡ Newman, 'Surgical Diseases of the Kidney,' 1889, p. 255, *et seq.*

§ Lawson Tait, 'Brit. Med. Journal,' vol. ii, p. 1087, 1889.

|| Keyes, 'New York Med. Record,' Feb. 8th, 1890.

2 (B) *The Treatment of Hæmaturia co-existing with Vesical Symptoms.*

B. (a) 1, 5, 8. *Stone in the bladder* (p. 40).—Rest in bed is often all that is needed to arrest the hæmorrhage in this disease unless prostatic engorgement co-exists. In the latter case gallic acid and opium had better be administered in addition to the routine remedies for allaying cystitis. If the patient is forced to move about, the injection into the bladder thrice a day of an ounce of warm oil, with which a teaspoonful of hazeline has been thoroughly mixed, will be often sufficient to allay irritation and check hæmorrhage.

B. (a) 2. *Subacute prostatitis* (p. 42).—Any of the balsamic remedies, the best being copaiba and sandal oil, are of service. Rectal enemata of four ounces of thin arrowroot, with fifteen drops of Battley's solution of opium, retained, if possible, in order to form a bowel poultice, will be quite sufficient to check the small amount of hæmorrhage.

B. (a) 2. *Chronic enlargement of the prostate in the young adult*.—Gross* says a frightful and even fatal hæmorrhage has occasionally been produced by masturbation. I have never met with a case, but I have encountered violent hæmorrhage consequent upon the reckless instrumentation of a prostate swollen and inflamed by masturbation (Case 4, p. 7), and have mentioned the treatment I adopted.

B. (c) 9. *Senile prostatic enlargement without much atony* (p. 52).—The hæmorrhage in many cases is beneficial, free from danger, and yields to recumbency, acidulated drinks, and gallic acid and opium. Ergot sometimes appears to increase the bleeding. Acetate of lead and opium may be tried, but I believe you can safely expect gallic acid and opium, with rest, to control even sharp hæmorrhage.

Prostatic atony.—Among the dangers of removing at one sitting the contents of an over-distended bladder in elderly men who have been suffering from prolonged prostatic obstruction is that of profuse hæmorrhage from the renal pelves, ureters, and bladder. The cause of it is well understood. The delicate vessels in the mucous membranes sheathing these surfaces have been greatly overstretched, their walls are thinned and weakened. They are also accustomed to the counter-support of the residual urine; when this is removed they suddenly become engorged with blood. The rush of blood throughout the flaccid meshes ruptures the walls in all direc-

* Gross, 'Diseases of the Urinary Organs,' p. 496, 1876.

tions, and blood flows freely out into the conducting and collecting section of the urinary tract. The treatment of this complication must be prompt. The clots and fluid blood and urine must be removed, and the bladder washed out with hazeline and cold water. It will be better to leave some ounces of boracic acid solution (4 per cent.) in the bladder to mix with the urine and prevent clotting. Some recommend vesical injections of cold water acidulated with vinegar (10 per cent.).

In a clinical lecture at St. Peter's Hospital upon hæmaturia, my colleague, Mr. Harrison, made the following very apt and valuable remarks. Apropos of this subject he said, "There is, however, a condition of the senile bladder which adds considerably to the trouble connected with bleeding. I refer to those instances where it occurs with a large prostate, and an atonic or almost completely atonic bladder. The great safeguard against prostatic hæmorrhage is the power of the bladder to exercise pressure. In two instances not only had I to empty the bladder of blood, but to keep it empty by pressure upon it and the retention of a catheter until the tendency to bleed had ceased, just as is done with the flaccid uterus. In both the instances I refer to this was successfully accomplished, and the patients recovered, though the loss of blood was considerable. It is not the least use depending upon hæmostatics in cases such as these. The mechanical reason why the bleeding will not cease must be recognised and acted upon, or the patients will flood to death, with their bladders distended with blood up to the umbilicus, as I have seen."*

In atony from other causes, *e. g.* tabetic, the same treatment holds. It is generally impressed upon you that if clots are left in the bladder they are liable to form the nucleus of future stones. This does certainly happen in rare instances, and I have observed one case myself, but the risk is small.

Mr. Cadge† mentions a case where he removed a stone weighing two ounces from a man who had twice been in hospital under the care of the physicians. The stone broke in the forceps, and large quantities of black material, like cinders, came away mixed with scales of calculous matter. It was found to be composed of alternate layers of dried blood and stone, with a nucleus of oxalate of lime.‡

* R. Harrison, 'Med. Press and Circ.,' p. 651, June 26th, 1890.

† 'Hunterian Lectures,' 1886, quoted by Harrison, *ibid.*

‡ Cf. interesting case of renal blood stone in Appendix O.

But it is surprising for what a length of time clots will remain in *healthy* acid urine without undergoing bacterial decomposition. They slowly disintegrate, and are passed like tea-leaves or slips of light tan. If, however, the urine is alkaline or ammoniacal, cystitis rapidly develops from the decomposition of the clot.

Prostatic carcinoma (p. 50).—The hæmorrhage in carcinoma of the prostate, although unusually obstinate, and sometimes beyond the control of drugs, is rarely profuse. I have known haze-line injections check it promptly where other remedies have failed.

B (a) 3. *Catarrhal or tubercular ulceration of the bladder* (p. 40).—In the earlier stages the bleeding may be checked by the administration of sandal oil, change of air, and in some cases by the insertion of a rectal suppository of morphia twice a day. The various hæmostatic drugs may be tried. I have known bleeding from deep ulceration resist all remedies and only yield to drainage, but this step should only be a last resource unless you have permission, and are prepared to curette or burn out the tubercular deposits. (Compare p. 139.)

Instrumental.—A single but thorough washing of the bladder with boiled filtered water will often be quite sufficient to check a smart hæmorrhage due to vesical ulceration in the earlier stages. As the disease progresses hazeline (a drachm to the ounce of boiled water) may be used, or an ounce of iodoform mucilage (p. 85) may be thrown into the bladder and left in, but there is great need for extra circumspection as regards cleanliness in dealing with tuberculosis topically. Irritating injections should be avoided, for often as not subacute cystitis is set up, and the epithelium is denuded by the various antiseptics or caustics used. The way is thus *unpaved* for inoculation. Worse still, septic changes are often induced by septic catheterism, and what before was tinder is now fire. The ureters become inflamed, and one or both kidneys become involved.

In the later stages, when the prostate has become involved, it is better not to wash out the bladder or to pass an instrument through the deep urethra at all. The hæmorrhage is sometimes kept up by phosphatic concretions, which must be removed; for advice on this difficult subject turn to p. 131.

B. (b) 4 (p. 43).—The hæmaturia of stricture usually subsides upon gradual but free dilatation, and the use of gallic acid and opium; or if the case is urgent upon internal urethrotomy.

Mr. Harrison strongly recommends the administration of the infusion of matico, a wineglassful every two hours.

B. (b) 5.—*Calculous cystitis following the removal of stone.*—It sometimes happens, after the calculus has been removed from a bladder, that the spongy mucous membrane still bleeds, and the patient has suspicions that some fragments have been left behind by the operator. This does undoubtedly happen, but there are bladders which still ooze although all grit has been removed. In some of these cases it will be found that phosphate of lime adheres to the inflamed surface in patches, and that when these deposits scale off the bleeding and irritation cease. The best method of treating this condition is, I believe, as follows:—If vesical irritation and pain co-exist the iodoform* mucilage had better be used.

R. Iodoformi, gr. x.

Mucilaginis Acaciæ (recent), q. s.

Aquæ Destill., ad ʒj. M. ft. inject.

Two tablespoonfuls to be injected into the bladder and left in, once daily, after the bladder has been thoroughly washed out with dilute Condly water.

If irritation is not present, change of air often arrests the bleeding promptly.

Prognosis.

The prognosis need hardly be dwelt upon. It depends on whether the cause can be removed or not. The hæmaturia of disease is rarely so profuse as to endanger life, though a persistent and copious loss often brings a patient to a dangerously anæmic condition.

CASE 29.—A patient, under my care six months ago, almost died in the operating theatre. He was breathless from severe symptomless hæmorrhage when he was admitted, and, as I did not know where the source of bleeding was, I proposed to cystoscope him. He was permitted by the carelessness or thoughtlessness on the part of the nurse, to ascend two flights of stairs to the theatre, and when he entered the side room I thought he would have died there and then. He was in a state of profound collapse. Stimulants and other restoratives were freely administered, and after a time he was carried back to his bed. For some days his condition was most critical, but, strange to say, after that grave crisis he never passed blood again, and has now regained health, strength, and weight.

Mr. Harrison† records a death from hæmaturia in his lectures. He says:

“In May, 1883, and some months previously, I saw a gentleman, æt. 50, with Dr. Adam; he was suffering from hæmaturia, and the conclusion we

* Stop iodoform directly the patient tastes it in his saliva.

† Harrison, ‘Surgical Disorders of the Urinary Organs,’ ed. 3, p. 245.

arrived at was that the bleeding was caused by a tumour within the bladder. By the use of matieo we were able very materially to restrict the amount of blood lost in this way, and at times it almost disappeared from the urine. Still, however, there were continuing symptoms, which could not be explained by any other view than that we took, and the necessity for operative interference was discussed. At 11 p.m. on October 6th, 1883, I was hastily summoned by Dr. Adam to meet him. When starting for a long railway journey at five that afternoon the patient suddenly found himself incapable of passing anything but pure blood by the urethra. He returned to his railway carriage, and there remained in the greatest possible agony during the whole of the five hours' journey down. Fortunately a medical man who happened to be travelling in the same train was able to give him some relief by a hypodermic injection. The agony, however, of a bladder distended with blood-clots was most exerceiating. When we saw him on his arrival at home that evening, we found him semi-conscious, and making most frightful struggles to empty his bladder by all natural and imaginary devices. His eyeballs were protruded, and his appearance was very distressing to behold. With some difficulty, by reason of his frantic struggles, we placed him under chloroform, and made out that his bladder contained a mass almost as large as his head. Being provided with a gum-elastic catheter eighteen inches in length, I succeeded in introducing this, and after it had passed through a dense mass of clot some bloody urine escaped, and then we were able to get rid of a certain portion of the fluid blood; still the bladder seemed to fill again just as fast as its contents were withdrawn. I thought I could distinguish with the point of the catheter something like the unevenness of a growth. We also tried to evacuate the bladder by means of Clover's apparatus for stone fragments, and in the use of this we were to a certain extent successful; the blood, however, welled up within the bladder, and there was little else for us to do. The terrible agony the patient had undergone during the railway journey, added to the loss of blood, which was not inconsiderable, caused death at 2 a.m.—that is to say, nine hours after the sudden hæmorrhage into the bladder first took place. We very much regretted that the friends would not permit even a partial examination of the body to be made."

I have known death to take place apparently from ureteral hæmorrhage in thirteen days. The case occurred in the practice of one of our old students, Dr. J. Arnallt Jones, of Aberavon. He very kindly forwarded the urinary tract and history to me, knowing the disease (epizootic) to be most unusual. I shall refer to it in my next lecture (*vide* p. 103).

In 1884 I saw a death occur from hæmaturia following acute myelitis.*

CASE 30.—Patient had only felt ill one day. At 11 in the morning, whilst at work, he noticed his legs were weak, and seemed to give way under him. He went on with what he was doing until noon, when he left for dinner. Whilst sitting down at the table his legs became rapidly worse, and on attempting to rise after the meal was finished he discovered that he

* Cf. "Hæmorrhage from Ureters and Bladder in a Case of General Paralysis of the Insane," G. Savage; and author, 'Path. Trans.,' vol. xxxvii, 1886, p. 111.

was paralysed. He urinated with the greatest difficulty, lying on his stomach and pressing his back with both hands. He never had had syphilis.

On admission he was found to be paralysed in the lower extremities, and to be suffering from retention. A catheter was introduced, and 23 oz. of clear urine were withdrawn. Nine days after onset of the myelitis, profuse bleeding with massy clots ensued. Median cystotomy was performed and the bladder drained. Patient died next day. An autopsy was not obtained.

I was unable to account for the hæmorrhage, and the case remained a puzzle until a very able article by Dr. Crooke and my friend Dr. Noel Nason appeared on the occurrence of acnte hæmorrhagic nephritis in suppurative meningitis.* This was followed by a note on the same subject by my colleague, Dr. Charles Ralfe.† He mentions three cases in which hæmaturia appeared upon recent acute myelitis. The subject, though of the greatest interest to me, is beyond the scope of my lecture, and I must refer you to the original articles.

SYNOPSIS.

Rules for ascertaining Source of Hæmaturia.

“The brighter and more arterial the colour of the urine, the nearer the source of the bleeding is to the meatus “if renal growth or injury to the kidney is excluded.

Blood appearing towards or at the finish of clear urination denotes a vesical or a prostatic origin.

Blood issuing from the urethra independently of micturition denotes hæmorrhage from the anterior urethra.

Long thin clots like earthworms or quill-barrels, shorter and thinner clots like red fishing-worms, indicate bleeding from the renal pelvis, for they are casts or moulds of the ureter.

“Large, irregular-edged, eroded clots are usually derived from a bladder source ” if renal growth or injury to the kidney be excluded.

Growth in the urine denotes a bladder origin, blood-casts a renal hæmorrhage.

Hæmaturia occurring after a blow on the loins or a shot-wound of the trunk is diagnostic of injury to the kidney.

If blood is *passed* copiously and persistently after a blow

* ‘Lancet,’ 1889, pt. ii, p. 1217.

† ‘Lancet,’ *ibid.*, p. 1307.

on the bladder it indicates extra-peritoneal rupture. If it escapes scantily one has to deal with intra-peritoneal rupture.*

Blood escaping from the urethra after a blow upon the perinæum is absolutely diagnostic of a laceration of the urethra.

1. *Hæmaturia without other Symptoms.*

Symptomless hæmaturia in which pus is absent from the urine, and the prostate and the urethra have been found free from disease.

Onset sudden, course intermittent, painless for months	a. Renal	Blood usually profuse and bright; intimately mixed	Renal cancer, 22, 71.
		Blood moderate, but bright; intimately mixed	Granular kidney, 23, 74; renal syphiloma, 25, 75; cardiac disease, 26, 75.
	b. Vesical	Blood intimately mixed, but probably noticed pure at end of clear micturition at some time or other in course of case	1. Sessile or short-pedicle benign growth away from vesical orifice, 27, 75.
			2. Epitheliomatous tumour of posterior wall or sides, 27, 75.

2. *Hæmaturia with co-existing Symptoms.*

A. *Renal Symptoms co-existing with Hæmaturia.*

i. Hæmaturia preceded by pain in the kidney	a.	Frequency marked at night; pus and débris passed usually in early stages. Blood unaffected by rest	Primary tuberculosis of kidney, 32, 79.
	b.	Frequency of micturition, if present, relieved by rest and at night; pus in later stages. Blood ceases on rest	Stone in kidney, 33, 80.
	c.	No frequency in earlier stages, and without renal colic	Growth of bladder partially occluding or dragging on lips of ureter, 37, 75.
ii. Hæmaturia accompanied by pain in the kidney	a.	Acute nephritis grafted on a granular kidney.	38, 74.
	b.	Rare forms of carcinoma of the kidney.	38, 71.
	c.	Rare reflex (?) conditions of the lower urinary organs, e.g. prostate.	38.

* Beck, 'Centralblatt für Chirurgie,' No. 44, 1883.

B. *Vesical Symptoms co-existing with Hæmaturia.*

Hæmaturia preceded by vesical irritability. Pain in the urethra, especially the glans on urination. Pain in other localities, indicating a vesical or prostatic origin	a. Childhood to young adult	Vesical irritability; pain and blood, subsiding on rest	Stone in bladder, 40 , 82.
		Frequency of micturition diurnal	Prostatic troubles due to gonorrhœa, 42 , 82. Benign growth at vesical orifice, 42 , 75. Vesical myomata, 42 , 75.
		Frequency nocturnal as well as diurnal, unaffected by rest except in the earliest stages	Catarrhal or primary tubercular ulceration of bladder, 40 , 84. Tubercle of prostate, .
	b. Adult up to fifty	. . . . .	Stricture and cystitis, 43 , 84. Hæmorrhagic cystitis, 47 , .
		. . . . .	Calculus; calculous cystitis, 40 , 85. Hard epitheliomatous ulcer, posterior wall, 48 , 75.
		Rectal evidence	Infiltrating carcinoma away from orifice, 28 , 75. Soft carcinoma overlying orifice of bladder. Prostatic carcinoma, 50 , 84.
		Bimanual evidence	Carcinoma breaking into bladder from contiguous organs.
	c. Old age	. . . . .	Stone in the bladder, 40 , 82. Prostatic enlargement, 52 , 82.

The numbers in large type refer the reader to the page where the disease is treated, and the number in small type to the page where he will find the treatment.

SECTION V.

UNDUE FREQUENCY OF MICTURITION.

IN pursuance of the plan laid down in my previous lectures, of estimating the clinical significance of the chief symptoms of surgical urinary disease, we approach to-day the consideration of the *irritable bladder* as expressed by an undue frequency of micturition. Although this symptom ranks second to hæmaturia in diagnostic importance, yet it affords us a somewhat more difficult study, for reflex neuroses and reflex excitation have a large share in its production.

It is difficult, of course, to define "frequency," or to state how often a normal bladder should relieve itself in the day, for much depends upon the activity of the kidney, and still more upon individual vesical capacity and habit. The amount of renal secretion varies with the loss of water from the skin, respiratory tract, and bowel. These surfaces are under the influence of many conditions, notably that of atmospheric change. In damp and cold weather the kidneys are active, and secrete more freely than in warm and dry seasons. The bladder will, therefore, have more work to accomplish in the former than in the latter time. Moreover some men, especially those whose opportunities for relieving themselves are few and far between, train their bladder to retain their urine for long periods. Others, again, are the happy possessors—a family inheritance—of a capacious bladder, and do not need to evacuate their water for many hours. As instances of the extremes I may mention that one or two patients I have had under my care relieve themselves only twice a day—on rising and retiring. Others, though in perfect urinary health, pass water every three or three and a half to four hours.

As a general rule, a healthy bladder should only require emptying four or five times a day, and not at all during the hours of sleep. The *average* call in chronic disease is every two hours in the day, and two and a half hours at night.

Before entering upon our task it would be as well, perhaps, to refresh our memory of the physiology of normal urination,

for irritability is usually an undue repetition of the normal stimulus to micturition.

The stimulus, upon which the smooth musculature of the bladder contracts, may emanate from various sources.

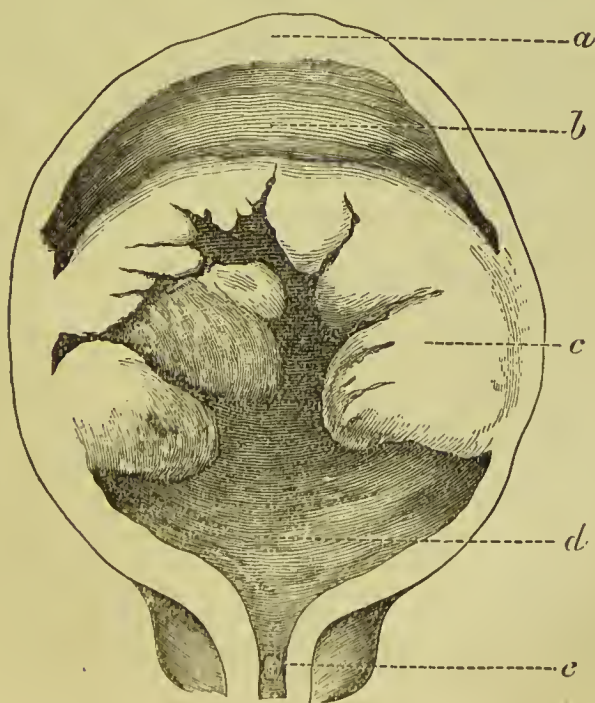
1. Normally a drop of urine is voluntarily pressed into the prostatic urethra. Here its stimulation of the mucous membrane reflexly releases the striped muscle sphincter, and excites the smooth muscle detrusors to contract.

2. The sensory nerves* in the bladder (or ureteric) walls, if stimulated, can themselves cause reflexly the evacuation of the urine. Thus the mere tension of an over-full bladder is capable of inducing spasmodic contractions of the vesical wall. A better example, and one less open to criticism, is noticeable after supra-pubic cystotomy for the curettage of ulceration or for the removal of growth. In these cases the exposure of the nerves in the mucous membrane causes the most urgent desire to micturate, and often violent spasms of the vesical muscle ensue, although the bladder is kept empty by means of efficient drainage.†

* Nerve plexuses and ganglia are found in the mucous, submucous, and sub-peritoneal layers.

† *Illustrative case* (31).—A patient who was in Cotton Ward, with the bladder

FIG. 6.



3. The terminal nerve meshes of the lower urinary organs, of the generative organs, and of the lower gut are so leashed together in the various pelvic plexuses and in the lumbar cord centres, that excessive stimulation of any one set of nerves overflows its corresponding centre to incite action in other and neighbouring centres. The bladder can thus be excited to evacuate its contents on extra urinary nerve stimulation.*

4. Cerebral impulses producing vesical evacuation can pass directly to the bladder, though the exact course of the conducting fibres is still a matter of dispute. Thus psychical or emotional disturbances, such as anger or fright, forces the bladder to empty involuntarily.

The various *abnormal* stimuli to frequent micturition may be grouped, therefore, without effort into three classes, which comprehend those regions whence normal stimuli arise:—1. Stimuli from the higher centres, such as the cerebrum. 2. Stimuli arising in extra-urinary regions, such as the large gut, male and female generative organs. 3. Stimuli originating in the urinary tract—chiefly in the vesico-prostatic region.

1. *The cerebral causation of irritability.*—The influence of the brain upon the evacuation of hollow viscera is a matter of every-day experience; thus gastric, cardiac, and uterine disturbances consequent upon irregular cerebral impulses are familiar to all of us. I do not doubt there are some amongst you who have found themselves suddenly afflicted with nervous diarrhoea, and others with an uncontrollable vesical irritability during the ordeal of examination. These are, of course, transitory impulses, and when the stimulus has passed the irritability ceases. All involuntary muscles are liable to these gusts of passion or of fear, and their misdirected energy is often able to cause great temporary inconvenience. When the brain, however, is kept continuously on

apparently filled with soft carcinoma, had cystotomy performed in the hope that some relief would be afforded from the agonising spasms he endured. Neither supra-pubic nor perineal drainage, nor opiates pushed to their toxic limit, had any effect, and the man died in greatest agony. The cramps or spasms were apparently due to the implication of the nerves of the vesical walls, for on post-mortem the entire middle zone of the bladder (Fig. 6) was found filled with soft carcinoma which had deeply implicated the wall, and transformed much of the muscle into malignant growth. A small free space, *b d*, was found at the apex and base (made evident in the diagram), but this could only have been potential, for when the bladder was contracted, as it must have been in life, the median tumour would necessarily encroach upon and fill up both these invaded portions.

* Stimulation of sensory nerves in other regions beside the pelvis has the same effect. Reflex contraction of the bladder can be brought about in cats by stimulation of the inferior mesenteric ganglion (Landois).

the stretch, as not infrequently happens in the high tension and keen competition of modern life, transitory attacks merge into habitual irritability, which is most difficult to treat successfully, and which may be mistaken, if the frequency is severe, for a symptom of organic disease. I believe Americans are more liable to this especial trouble than we are, but many in our learned professions, and those with weighty commercial or other anxieties and responsibilities, are sufferers.

The bad habit of frequently emptying the bladder can be easily acquired by unconscious imitation. Thus a well-known practitioner has informed me that when a student he was in the habit of crossing Hyde Park every morning on his way to early lecture with a friend who suffered from frequency of micturition. The vesical irritability forced his friend to relieve himself repeatedly in the course of the walk, against a tree or fence, or some such convenient shelter. Gradually the desire to imitate this example seized my friend, a frequency was induced which increased in proportion as it was complied with, and finally became so urgent that the companionship had to be discontinued for fear of establishing a habit of so annoying and unpleasant a nature.

It has been supposed that the repeated contraction of the bladder excites the kidney to fresh activity, so that a vicious circle is created, the limpid renal secretion inducing a vesical irritability, which reacts in its turn to stimulate a hypersensitive secreting surface to supply a greater flow. I do not think this theory is correct, or even necessary. The kidney, stimulated by a cerebral impulse, secretes a limpid urine of low specific gravity, which the bladder resents, and therefore expels. You detect the functional nature of the trouble by the character of the secretion (*urina nervosa*) which accompanies it, also by the irritability usually ceasing when the patient is asleep. You may be told that the nights are disturbed, but careful questioning will often elicit the fact that the patient does not sleep well, and that when he is wakeful his bladder worries him, but that when he does get fairly asleep he is not awakened by any vesical summons.

Treatment.—You recommend an exercise of will. The habit can be gradually broken by resisting the call. “The bladder,” as Sir James Paget has aptly remarked, “is a good servant but a bad master;” * each can and should train the bladder as he would any other muscle. Much good can be done by

* Sir James Paget, ‘Studies of the Case-books,’ p. 161.

codeia, small doses of opium or nux vomica, digitalis, and potassium bromide. In one patient, who gave up a lucrative position on account of this form of irritability, I was able to break the vicious circle by injections of a 4 per cent. solution of cocaine into the prostatic urethra twice a day.

2. *Extra-urinary sources of irritability.*—These certainly deserve your most careful attention, for much of your success, or the reverse, will depend upon the keenness and thoroughness of your search. The intestinal canal is usually to blame. Some focus of irritation, such as an overloaded sigmoid or cæcum, an ulcerated pile or fissure, oxyuria, eczema of the anal orifice, forms the cause of the reflex excitability, which is often as readily removed as it is easily found. Let me give you a good example.

CASE 32.—An old gentleman travelled to England, not long ago, in search of some relief from a distressing though painless irritability of the bladder. It had proved most obstinate, and was said to be uncontrolled by sedatives. He appeared with the indispensable urinal. There was no evidence of disease either in the urine or in the character of its evacuation. His appetite was good, his digestion unimpaired. He mentioned, quite casually, that there were always a number of “white specks” in his fæces. The hint was taken, and a dose of *felix mas* and castor oil at once relieved him of a good specimen of tapeworm—and his urinal.*

Next to the large gut stand the generative organs as causative agents in reflex vesical irritation. Boys with long prepuces, with hardened smegma under uncovered foreskins; girls with foliaceous papillomata around the urethral orifice, or with irritating vaginal discharges, are not only troubled with nocturnal incontinence, but suffer from frequency of micturition and definite cystospasmus in the day. They cannot retain their urine very long, and when the call comes to urinate, it is so imperious that unless it be complied with at once the urine is violently evacuated into the clothes. By removing freely a ring of sodden broad-leaved vegetations which fringed the urethral orifice I was able to relieve a young lady of twenty-two of a lifelong night and day misery. Let it be a golden rule with you, before treating routinely a *painless irritable bladder*, to institute a strict search for sources of irritation outside the urinary tract.

3. *True urinary frequency.*—If the renal secretion is greatly increased the bladder must of necessity expel its contents more often. It is obviously necessary, therefore, to distinguish between a hypersecretion of urine, which causes the

* Compare a similar case recorded by Tufnell, ‘Med. Times,’ April 26th, 1848.

bladder to evacuate as often as it is filled (frequency of quantity), and some abnormal stimulus which excites the bladder to contract frequently upon a small quantity of urine (frequency of irritability). The former is usually the result of a pure physiological stimulus, the latter is most often the outcome of some organic change in the lower urinary tract.

(A). *The frequency of quantity.*—It is necessary to draw your attention to the “frequency of quantity,” because it often happens that patients apply for relief of a distressing frequency of micturition, and this is found on inquiry to be only due to the large amount of urine that is secreted. A glance at the table will be sufficient to remind you of the usual causes for polyuria, and only one or two items in it will need further notice.

A. *The Frequency of Quantity.*

(*Much urine which is passed often.*)

Persistent excess	Highs.g.*	Sugar	Diabetes mellitus.
		No sugar, but extreme thirst	Diabetes insipidus.†
	Low s.g.	Albumen with casts, but without pus or residual urine	Chronic Bright's disease, such as granular kidney, amyloid kidney of advanced scrofulous or syphilitic affections.
		No albumen, but with residual urine	Back renal pressure from prostatic atony or direct renal irritation of prostatic origin.
Transient excess (usually diurnal)	Low s.g., clear	(a) Sexual excess or debility (without inflammation).‡	Dietetic idiosyncrasy—tea, beer, &c.
		(b) Hypochondriasis, hysteria,§	nervousness.

* It is usual, but not absolutely necessary, for a case of diabetes mellitus to secrete urine of a high specific gravity; it is rarely under 1025, though it has been known to be as low as 1010.

† I may remind you that diabetes insipidus is said to be distinguished from other low specific gravity polyurias by the large amount of uræa which is excreted. The daily quantity of uræa in diabetes insipidus is said to be three or four times the normal amount (Dickinson, ‘On Diabetes,’ p. 206). In other forms of polyuria the amount of uræa excreted is below the normal (the normal is 500 grains daily in adult men between the ages of twenty and forty—or 3½ grains per pound of the weight of the body).

‡ Concerning sexual excess there is a proverb which appears very often in German writings upon this subject: “Custus raro mingit.” Sexual excess, quite irrespective of inflammation of the prostatic ducts, produces a transient diuresis—I believe by reflexly congesting the kidneys.

§ I have not met with cases of true hysterical diuresis or frequency myself,

Chronic Bright's disease.—You are doubtless well aware that contracting granular kidney may exist for a considerable time, and may even be “in a serious degree of development” before the patient is aware that there is anything amiss with him; that for years the appetite and digestion remain unimpaired, and that health and strength seem perfect. Suddenly the appetite fails, the patient becomes dyspeptic, he is tortured with thirst, and passes a great deal of urine, so that he fears he is afflicted with diabetes. As the urine is often secreted more abundantly *at night*,* the frequency of micturition is noticed to be worst during the hours of sleep. Now, when we come to consider the frequency of the diseases grouped in the table under the heading of “The Frequency of Irritability,” the necessity of ascertaining the nocturnal frequency will be insisted upon as an important feature of differential diagnosis; and this occasional peculiarity of granular kidney is touched upon now in order to show you how easily you may be misled by your patient declaring that he is forced to rise frequently at night to urinate. Do not accept the statement, but inquire as to whether he passes much water or not, and have the amount measured.

The polyuria of direct vesico-prostatic irritation.—Any congestion at the neck of the bladder, such as obtains in sexual excitement, is apt, in some people, to produce an increased

though I have once had to treat a patient of Prof. Chareot for hysterical suppression. I have placed Prout's opinions in the Appendix for those who need or who care to pursue this section further.

* Prof. Carl Bartels (*‘Ziemssen's Cyclopædia,’* vol. xv, p. 431) relates an extreme instance of nocturnal polyuria, in which $9\frac{1}{2}$ piuts (6000 c.e.) were passed between 8 p.m. and 8 a.m. The urine had a specific gravity of 1004, and contained albumen. Bartels says, “No other patient of mine ever passed so huge an amount. In only one private case could I feel sure that I had really estimated the entire quantity of urine passed for a whole month. This patient excreted on an average 111 oz. (3350 c.e.) daily. The fact is remarkable that the patients are invariably more tormented with the desire to pass water by night than by day. One of my private patients, for example, who throughout his day's work from 9 a.m. to 4 p.m. had no call to empty his bladder, was forced to get up three or four times every night to urinate. It appears that this greater frequency of the desire to micturate at night is founded upon the more abundant secretion that takes place at this time. The diurnal amount of urine passed by the above-mentioned patient was collected for a month, and upon twenty-six days out of this month the night urine was separated from that of the day. The day's urine, taken from seven in the morning to ten at night, stood on an average at 1370 c.e. (45 oz.), that is at 91 c.e. (3 oz.) per hour; while the night's urine, consisting of that passed during the nine night hours, presented an average of 2190 c.e. (72 oz.), that is 242 c.e. (8 oz.) per each hour. This patient was forced to get up at least four times each night to pass water. Another patient passed in ten successive nights upon an average 960 c.e. (32 oz.) each night, and upon the corresponding days only 635 c.e. (21 oz.).”

but short-lived flow of urine. When there is a permanent source of irritation* which does not give rise to other symptoms, there is often a similar but persistent excess.

Thus in the early stage of tubercle of the prostate, and in commencing senile enlargement of that organ, the kidney is often reflexly excited to increased activity, and a limpid polyuria results. It seems to me that when this is observed it forms a valuable prodrome to disease of that body. Again, backward pressure from any partial urinary obstruction produces the same phenomena, so that polyuria may be a symptom of surgical urinary disease.

But if our patient complains of passing urine often and in small quantities, and other symptoms of urinary irritation co-exist, such as pain or scalding on micturition, obstruction to the stream, or puriform urine, we have some cause irritating the mucous membrane of the urinary tract, and thus reflexly exciting the vesico-prostatic spinal centres. The question we must then put to ourselves is, "Is this frequency of micturition attended by obstruction to the stream or not?" for we can separate the sources of irritability into two groups, those without and those with obstructive powers.

B. *The Frequency of Irritability.*

Little water which is passed often.

1. Without obstruction to the stream	(a) Without pus	} Blood, lithiasis, phosphaturia, oxaluria, dyspepsia.
	(b) With pus	{ Various irritants in renal pelvis and ureter, stone, tubercle. Movable kidney. Cystitis of all grades. Catarrhal or tubercular ulceration of the bladder. Hard Cancer.
	(c) With prostatic "threads" of pus	{ Micturition reflex, excited by inflammation or congestion of the prostatic mucous membrane, <i>e.g.</i> Gout. Catarrhal prostatitis. Masturbation. Prostatic tubercle and stone.
2. With obstruction to the stream	Diurnal	{ Stone, stricture (6 F. gauge), prostatitis, muscular atony (low degree), vascular growths of urethra in female.
	Nocturnal	{ Enlarged and congested prostate without much residual.
	Diurnal and nocturnal	{ Enlarged prostate with residual. Cancer of prostate.

1. Without obstruction to the stream. (a) the urine contains blood, but no pus.

I have often asked myself whether blood in the urine

* This has been regarded in the light of an example of a physiological law that irritation at the mouth of the excretory duct of a gland increases the flow of secretion from that gland (Curtis).

can of itself cause a frequency of micturition. There is no doubt that the mucous membrane lining the lungs and the abdominal hollow viscera resent the presence of blood, and are stimulated either by its alkalinity or by its weight to reject it. Thus blood swallowed or escaping into the stomach usually acts like an emetic. Again, fresh and fluid blood suddenly poured into a healthy but empty or nearly empty bladder, *e. g.* from a ruptured kidney, is violently and rapidly expelled therefrom. Profuse bleeding can stimulate the vesical mucous membrane, and therefore much blood possesses the power of inducing irritability. In considering the question whether a *moderate* amount of blood in the urine acts as a stimulus to the vesical walls we encounter certain conditions in hæmaturia which may mislead; such as (1) any obstruction from a clot in the neck of the bladder is liable to induce straining and frequency. (2) The accident or disease which gives rise to the bleeding may be such as to induce irritability of the bladder. (3) If there be localised submucous extravasation or congestion of the bladder there is always frequency, and most likely the same holds good for the ureters and pelves of the kidneys. (4) Any decomposition of the blood rapidly causes superficial denudation of the surface epithelium, and in these cases there is an irritability of the bladder caused by the presence of blood. In selecting our material, then, from which we have to draw our conclusions we should, I think, choose pure villous growths of the bladder; and from a consideration of such cases I think I may make the following statements:

A healthy bladder soon becomes accustomed to the presence of blood, and if there is no surcharging of the secretion with blood, no retention or obstruction to the stream, frequency of urination will not be noticed; a moderate and persistent amount of fresh blood in the urine will not of itself induce frequency of micturition.

On the other hand, the cystoscope has demonstrated that in those cases where the presence of vesical blood in the urine is persistent, and frequency of micturition only appears now and again, there is nearly always some inflammatory change of the mucous membrane, localised or general, to account for the bouts or attacks of irritability.

(a) The urine deposits a crystalline sediment, but contains no pus. Prout* has well said that "healthy urine constitutes the *natural* and proper stimulus of the renal and vesical cavities. All deviations, therefore, from the normal condition of

* *Ibid.*, p. 391.

the urine, whether in deficiency, in excess, or in kind, are recognised by the containing organs, and may prove a cause of *feeling*—in other words, a source of irritation in the kidneys and bladder. Hence, whenever the urine is very dilute or very concentrated, or is preternaturally acid or alkaline, or contains any unnatural ingredient, the urinary organs in general, and the bladder in particular, though perfectly healthy, are liable to become excited and irritable, and the individual has no peace till the unnatural secretion be discharged. In such cases the fault lies not in the bladder, but remotely in the kidneys and assimilating organs, and in this mode and to this extent the bladder may occasionally become irritable in all individuals at all ages.” Since the introduction of the electric light I have examined many bladders in which irritability existed apparently as the result of a urinary deposit. If it is uratic or phosphatic it can be seen with the cystoscope carpeting the whole of the bladder base, like thinly fallen dirty snow, and the mucous membrane after washing has the dark red gelatinous aspect of constant irritation.

The surface epithelium in the majority of cases has not been shed. This denudation only occurs to a marked extent when inflammation has been superadded from some external source, such as posterior urethritis or pyelitis. It has, however, often surprised me how much washing these deposits seem to need before they are removed from the bladder surface. Whenever more than usual difficulty is encountered I am inclined to suspect that the epithelium layer is losing its smoothness, and that my cystoscopic view will be blurred. I have been often confirmed in this conjecture by finding the surface badly illumined, although my incandescent lamp is burning at full tension. The reason for this loss of light is obvious; the rays are absorbed, and not reflected and increased as they ordinarily are when they are cast upon a healthy glistening mucous membrane. This continual irritation of crystalline deposit upon a hypersensitive and congested surface is in itself sufficient to induce an irritability, but I suspect the exciting force does not rest here. I believe the congestion creeps into the prostatic urethra, and thus a greater frequency is induced by every fresh tide of heavily laden urine which flows out, to aggravate the over-sensitive prostatic surface. Sharp uric acid crystals, oxalate of lime, or amorphous phosphate of lime are all able to induce not only a distressing frequency, but the most complicated sensory neuroses of the genitals, a point to which I will refer in my lecture on “Pain.”

Treatment.—If the urine contains, *on or shortly after evacuation*, a urinary sediment without pus, you naturally turn your attention to the state of the digestive function and the skin. Do not be above examining the teeth or inquiring as to whether mastication is slowly and thoroughly or slovenly performed. The influence of this upon the urine is hardly realised. I was told, in connection with a case of stone brought me by Dr. Wilberforce Smith, that after a new set of teeth had been supplied to the patient the urine rose in specific gravity from an average 1015 or lower to 1025.

Inflammatory or chronic dyspepsia must be combated, the bowels regulated, and the character of the urine influenced by drugs or natural mineral waters, according to the character of the deposit found.*

(b) The urine contains pus.

Various irritants in the renal pelvis or the ureter causing frequency of micturition.

It has been known since the times of Valsalva that certain diseases of the kidney are able to induce a most distressing irritability of the bladder.† A common illustration of this fact is met with occasionally in cases of *acute* parenchymatous nephritis. The onset of this disease is sometimes heralded by a distressing and urgent frequency of micturition. This symptom usually passes away in a few hours, and is replaced by the characteristic features of the disorder, but it is sometimes so severe while it lasts as to mislead the practitioner into believing the patient is attacked with acute cystitis. The bladder is also sometimes affected in the same manner in *chronic* disease of the kidney, and attention has been particularly directed to this subject by Sir B. Brodie, who records two cases in which post-mortem examination completed the clinical history. The first instance was that of a gentleman who voided his urine frequently and in quantity varying from an ounce to an ounce and a half. “Always after making water he had a severe pain, lasting a few minutes, and extending along the course of the urethra. The urine was pale, semi-opaque, of an acid quality, and, when tested with heat and nitric acid, it was found to be

* Notes on diet and regimen in dyspepsia, extracted by permission from Dr. Samuel Fenwick’s “*Outlines of Medical Treatment*,” will be found in Appendix M.

† Morgagni, ‘*De Sedib.*,’ Epist. xlii.

highly albuminous. Occasionally small masses of a substance resembling coagulated albumen were seen floating in it. He made no complaint of pain in the loins; he was able to empty his bladder by his own efforts, and the urethra was free from stricture. There was no calculus in the bladder, nor had sand or gravel ever been observed in the urine. These symptoms had begun to exist ten months previously, since which time they had gradually increased. For a short time the urine had been tinged with blood. In addition to these local ailments the general health was much impaired; the patient had lost flesh, was languid, dejected, and of a pallid countenance. Soon after Brodie was consulted the urine became again tinged with blood. The bodily powers continued to fail, and the local symptoms became more urgent. There was a total loss of inclination for food, the extremities became cold, the pulse feeble, and he died.*

On examining the body after death the kidneys were found to be of a dark colour from excessive vascularity, and of a soft and somewhat brittle consistence, the distinction between the cortical and tubular portions being less marked than under ordinary circumstances. The investing membrane of the kidney had a very slight adhesion to the kidney itself, but it adhered very closely to the adipose substance of the loins. On the surface of each kidney, and partly embedded in its substance, were four or five membranous cysts, each of the size of a large pea; and in one of them there was a similar cyst, but as large as a nutmeg, completely embedded in the cortical substance. The *pelvis, infundibula*, and ureters were not more capacious than under ordinary circumstances; but on their being split open their internal membranous substance presented the appearances of considerable inflammation.

It could not be said that the bladder was found altogether free from disease, but the morbid appearances were so slight, compared with those observed in the kidney, that it seemed impossible to doubt that the last-mentioned organ had been the seat of the primary disease, and that the latter was affected only in a secondary manner. It was contracted, and the muscular tunic was somewhat thickened; but not more so than must have been the case in a person who from any cause had been teased for a considerable time by an incessant inclination to void his urine. The vessels of the mucous membrane were turgid with blood, but not in the same degree as those of the membranous structures of the kidneys." I

* 'Lectures on Diseases of the Urinary Organs,' 1842, p. 124.

cannot give you any example from my own experience of this class of case, for usually they come under the care of the physician; nor can I comment upon this case with any certainty in the absence of the record of the state of the heart and vessels. I mention the subject merely as an introduction to the following very important subject.

Various irritants in the renal pelvis or ureter, such as stone, tubercle, parasites, are able to induce a vesical irritability. (i) Stone in the kidney is able, I believe, only to induce a frequency of micturition when inflammation co-exists, or when the discharged urine is highly concentrated and irritating. It is otherwise with the descent of a stone along the ureter; here the muscular spasm passes along that canal and flows over the bladder, causing frequent and painful contractions of that viscus; the incessant desire to make water being quite unallayed by the small quantities of high-coloured or even blood-tinged urine which is every now and again expelled.

This strangury and frequency can be readily understood by examining the ureteral orifice in normal bladders by means of the electric cystoscope. As the little opening gapes, and a tiny swirl of glycerine-like fluid streams into the vesical water, a rhythmic contraction of the ureteral orifice and the surrounding bladder-wall takes place. Should the orifice be projecting inwards as a cone, the apex will alternately recede and protrude. In renal colic this wave of muscular spasm will be multiplied manifold, and the entire side, if not the whole of the strong muscle-planes of the bladder will contract, and distressing frequency and vesical colic will ensue.

Pyelitis.—Inflammation, whether acute or chronic, whether of calculous, tubercular, or of septic origin, is a fertile source of vesical irritation. You are still taught in some books that the consequent frequency is “due to reflex action,”* or is “the result of nervous sympathy.”† With this, however, I cannot altogether agree, nor do I believe it is always the outcome of the acidity of the urine, but I will speak of this more fully under the heading of Causes of Vesical Irritability (p. 104). The irritability is accentuated when pyelitis of scrofulous or of the tubercular type is present. Please understand me, I am referring not to that stage in which the bladder becomes affected by contiguity, but to a period immediately preceding the vesical invasion. In the former the irritability of the bladder is excessive; in the latter it exists in comparison only

* Keyes, ‘Genito-urinary Diseases,’ p. 336.

† Dickinson, ‘Urinary Affections,’ vol. iii, p. 934.

to a moderate degree, and is certainly due to the acridity of the tuberculous urine, which causes swelling and excoriation of the mucous membrane of the base of the bladder and of the prostatic urethra. The swelling and congestion are very obvious with the electric light. I believe this ploughshare action of the urine permits the seeds of tubercle to be sown more rapidly and more effectually.

Parasites.—The only case I have met with in which parasitic disease of the ureter induced a distressing frequency was sent to me in the form of notes and specimens* by my friend Dr. Arnalt Jones, of Aberavon. Even this is open to objection, for all the symptoms might have been induced by sudden renal congestion and hæmaturia.

CASE 32.—Mrs. Jane Q—, æt. 51 years, robust, energetic woman. Family history good, with no hereditary disease. On March 13th, 1887, she expressed herself to her husband as “feeling unwell” and out of sorts, and she remained in that condition, but continued performing the whole household duties, till the 17th, when she was obliged to give up work, and complained of severe hypogastric pain, which towards evening became extremely acute. On the morning of the 18th frequency of micturition with hæmaturia appeared.

The urine was examined and found to be acid, and contained blood intimately admixed with it, but no cast or other deposit could be discovered under the microscope. Micturition was intolerably painful and frequent, the patient having to void urine every quarter of an hour, and she expressed the pain as being much more severe than that attending parturition.

On the 19th several clots were passed, the pain and frequency of micturition increased, and the urine became fetid and alkaline. The bladder was sounded and examined *per vaginam* with negative results; neither stone nor adventitious growth could be detected.

March 21st.—The patient was now very anæmic from the continuous hæmaturia, and naturally greatly exhausted from want of sleep, for the same frequency of micturition had persisted night and day.

On the 27th the temperature rose to 101° F., the urine was voided half-hourly, but the pain had much abated. The rise of temperature was maintained, and the other symptoms remained as last noted, while the exhaustion increased, and the anæmia became more profound until the time of her death, which occurred on March 30th. The patient remained sensible to the last.

Mr. Eve has described the specimens as follows in the catalogue of the Royal College of Surgeons Museum, Nos. 3644 C and D:—“Section of a kidney with the uroter, which is the seat of psorospermial cysts. Its inner surface is thickly studded with closely grouped rounded cysts, of the size of millet seeds, and of a yellowish colour. They project prominently from the mucous membrane, and cease at a point an inch

* This is described by Mr. Eve, ‘Pathological Trans.,’ vol. xl, 1889, p. 444.

and a half below the pelvis. With the exception of changes the result of decomposition, the kidney appears healthy."

"A portion of the opposite kidney from the same case. There are two ureters, both of which are affected in the same manner as that in the preceding specimen; but in these some of the cysts appear to have ruptured, and have left minute rounded apertures in the mucous membrane. The mucous membrane of the bladder was healthy. Microscopic sections made at right angles to the surface of the ureter, after embedding in celloidin, showed the following appearances. There were several cysts about the size of millet seeds, which contained a colloid material. In this lay many ovoid bodies, corresponding in size and appearance to pseudo-navicellæ. Some of them were rounded at one end and pointed at the other. A few only were perfect, the majority apparently breaking up."

Moveable kidney is also able to induce frequency of micturition.

The Cause of the Vesical Irritability in Chronic Affections of the Renal Pelvis and Ureter.

There is no doubt that many of the cases of vesical "sympathy" with foreign bodies or with disease of the ureter and renal pelvis is due to the irritating effects of the urine which travels over the sensitive neck and base of the bladder. It is certainly not a practical point to investigate, but it is interesting to note how very often the "sympathy" or the "reflex" theory falls to the ground on examining the bladder in these cases with electric light. In chronic irritants in one pelvis, such as unilateral pyelitis, there is usually cystoscopic evidence of *direct* irritation of the stream of urine around the corresponding ureteral orifice and over the bladder neck. This is seen as localised congestion, œdema, and even slight superficial denudation of the surface. Moreover in unilateral stone or unilateral concentration of the urine (for I am sure that one kidney often works quicker and better than the other) the neighbourhood of the corresponding ureter is often seen by means of the cystoscopic microscope to be distinctly papillated.

CASE 33.—The most remarkable case I have noticed was in a lady, æt. 27, who was sent to me for nephrolithotomy. She had had renal hæmaturia for some months, and her symptoms were characteristic of renal stone. As a child she had suffered for some little time from blood in the water and difficult micturition. Again at the age of fifteen, after a ride, she had had a similar attack. A year before coming under my care she passed, with much difficulty,

straining, and frequency, a good deal of blood. Since this time she had always suffered pain in the right kidney, increased by exercise or jolting. The urine was very scanty, 1020, clear, and deposited a very large amount of uric acid.

Cystoscopy.—"The orifice of the right ureter is patulous, but not prolapsed. The surrounding mucous membrane is swollen and distinctly papillated, so much so that with the microscopic cystoscope it resembled sub-villous growth. The rest of the bladder, and the opposite ureteral orifice and neighbourhood, were healthy."

This lady subsequently passed a uro-phosphatic stone after a course of alkaline water. Dr. Randall Davies, of Hythe, under whose care she had been, kindly sent me the calculus for analysis.

To sum up briefly, we may assert, then, that the bladder in this class of case is not so healthy as is supposed. All the evidence upon this point has hitherto been operative or autopsial. The cystoscope shows that in the majority of these cases there is, in addition to the renal disorder, some slight concurrent disease of the bladder as well, and that the vesical symptoms are merely the expression of this vesical change, aggravated, no doubt, by urine flowing from an irritating renal source.* Patches of congestion, localised extravasation of the mucous membrane of the bladder, erosion of the vesical lips of the ureteral orifices, or papillomatous condition of their immediate neighbourhood, and swollen glands at the bladder neck are all easily overlooked on the post-mortem table, for then congestion has disappeared or has become merged with the discoloration of decomposition. But these are all plainly visible with the light, and are able to induce much bladder irritability. Moreover I cannot help believing that observers have often been deceived by descending tuberculosis. Not infrequently *latent* tuberculosis of the kidney will progress insidiously until it has reached the bladder by way of the ureter. Then, and not till then, will the disease induce vesical irritability and pain, and the latter will not be of a renal type, but possess vesical, perinæal, and penile characters.

I have only lately met with the following expression of opinion by Billroth.† As it is so lucid, and as it is so exactly verified by the cystoscope, it is worth your while to remember

* Brodie has remarked that there is no reason to doubt that unhealthy secretions of urine act as a stimulus to the parts with which it comes in contact, and that an irritable state of the bladder is the consequence. He says, "In such of them as have fallen under my observation the urine has been always altered from its healthy condition. When first voided the secretion is of a pale yellow colour, opaque and turbid, sometimes having minute flakes of lymph floating in it. Pus and albumen are present" (Brodie, *ibid.*, p. 132).

† "Chirurg. Erfahrungen Zürich," 'Arch. für klin. Chirurg.,' Bd. x, 1860-7; Coulson, p. 250.

it. Billroth thinks that irritability of the bladder occurring in the absence of any discoverable cause may find its analogue in the spastic phenomena which accompany superficial affections of various other mucous membranes. He alludes to kerato-conjunctivitis, catarrh of the stomach and intestines, excoriations and fissures of the rectum, and various forms of catarrh of the air-passages; all of which affections are accompanied by more or less spasm and irritability, and are characterised by marked hyperæmia of the mucous membrane with superficial epithelial denudation, and sometimes slight excoriation. He believes that similar pathological changes of slight extent occurring on the neck or base of the bladder, or in the ureters or pelvis of the kidneys, may, in the absence of other causes, sometimes account for the symptoms indicated by the term "irritability of the bladder."

The Diagnosis of the Reno-ureteral Origin of Vesical Irritability.

In the class of case we have just glanced at you are rightly taught to avoid making exhaustive examinations of the bladder with instruments, because the entire cause of the vesical trouble lies in the kidney. But by what symptoms are you to be guided in determining the reno-ureteral section to be the *fons et origo* of the vesical irritability?

If the urgency and frequency of micturition be due to some acute inflammatory change in the kidney, such as acute parenchymatous nephritis or some cause for sudden ureteral spasm, such as stone, slough, clot, other symptoms will rapidly develop, upon which you will be able to base a certain diagnosis. If we except these acute conditions, the only others that need occupy our attention are those included in the class of pyelitis.

In well-marked cases of pyelitis, with a straightforward previous history of gravel, pain in the back, or in the affected loin, coupled with attacks of renal colic, the disease can be detected and diagnosed as calculous pyelitis with tolerable certainty. But it is otherwise in latent chronic pyelitis.*

It not infrequently happens that not only in primary subacute pyelitis, but also in that form which has arisen by continuity from other and neighbouring inflammations, such as cystitis, prostatitis, the onset is very insidious, and the renal pain

* Latent pyelitis is developed more or less constantly as a complication of typhus, typhoid, influenzæ fever, exanthemata, diphtheria, &c. It is said to be not infrequent in acute and chronic Bright's disease and diabetes mellitus.

is not at all a prominent feature. I may especially draw your attention to the latency of pyelitis after miscarriage, pregnancy, puerperal parametritis, occasional cases of primary scrofulosis of the kidney, and mild pyelitis, which is due to gonorrhœa and gout. In these instances it is very difficult indeed to distinguish a chronic pyelitis with bladder irritability from a chronic cystitis.

Differential diagnosis.—In pyelitis the urine is usually acid, notwithstanding that pus is present. The pus sinks to the bottom of the glass if it be laudable and sweet, almost at once leaving the upper layers clear; even when much mucus is present it settles in a dense greenish-white compact layer. It is, moreover, often intermittent in quantity. The urine may be malodorous, and yet the secretion may be acid; triple phosphates* may be present, and their edges may appear bitten out or crenated by the healthy acid urine which flows from the other kidney, and mingles in the bladder with the tide from the pyelitic source. Usually chills, shiverings, even pronounced rigors are present, and they recur often, with the regularity of ague, or, on the other hand, only upon vesical interference. Fever is often present, and in the tubercular cases may assume a hectic type. Some authors mention a blotchy erythema which breaks out on the face, and occasionally on the trunk, resembling German measles.†

Lastly, as an element in diagnosis it will be noticed that washing of the bladder has no effect in checking the pus, and the urine at the end of the irrigation is found to be still milky, and to contain pus.

Failures and the Dangers of Injudicious Treatment of Pyelitis.

Failure.‡—In the belief that he is dealing with subacute cystitis, the practitioner adopts the routine treatment of washing out the bladder, which he often does thoroughly, frequently, faithfully, but fruitlessly. I do not think there is much actual

* Ebstein (Ziemssen, vol. xv, p. 574) says the diagnosis of pyelitis can be made with certainty when the characteristic cells of the renal pelvis are found in purulent urine. I cannot endorse this on account of the similarity in appearance between the vesical and renal pelvic epithelia.

† Dickinson, 'Urinary Diseases,' vol. iii, p. 666.

‡ "One symptom of pyelitis is very liable to lead to error in diagnosis, especially if the pain in the back has not been prominent and no tumour exists in the flank. This symptom is frequent micturition. This irritability is due to reflex action, and by it the bladder is stimulated to repeated contractions, and many a case of pyelitis has been treated as chronic cystitis, powerful injections being thrown into the bladder in the vain hope of controlling the pus which is supposed to have its origin there" (Keyes, 'Genito-urinary Organs,' 1888, p. 336).

danger in treating *non-tubercular** pyelitis by vesical irritation. If the patient be endowed with implicit faith, boundless patience, and ample means, I cannot say that much bodily harm will be done. I would go farther, and say that if the pyelitis has ensued from a lower urinary source the irritability may be greatly relieved, but the pyelitis will remain.

I can give you excellent examples, but one will suffice.

CASE 34.—A lady, aged 40, was brought to me by Dr. Rice Oxley with a diagnosis of chronic cystitis. Symptoms had existed for three years, and she had been invalided home from Ceylon on account of them. There was pain at the meatus at the end of micturition; urination was not very frequent. The secretion was neutral, sp. gr. 1021, and the specimen deposited a large quantity of pus. Various consultants had been seen, and various remedies had been suggested; bladder washes had been tried *ad libitum*, and medicines *ad nauseam*. The bladder had been sounded by one consultant; the urethra dilated and the bladder digitally examined by another. Dr. Oxley at last had misgivings as to whether there was not some cause which had been overlooked, and asked me to examine the bladder with the light. The electric cystoscope showed the mucous membrane of the bladder to be greatly swollen, and the base to be much congested and very velvety. The ureteral orifices partook of the same change, being oedematous and pouting. I did not know how far all this might not have resulted from treatment. Iodoform emulsion was therefore injected into the bladder. After a short time her vesical trouble and pain disappeared, and when I next used the cystoscope the bladder was healthy, but the orifices of the ureters were still pouting and thick. I now concluded we had to deal with mild pyelitis, and my diagnosis proved correct, for with a little boro-benzoate of ammonia and change of air all her symptoms disappeared. I saw this lady two years after; she was then quite without pain or frequency. Her urine, which was greatly influenced by changes in the weather, still contained some pus, but otherwise it was healthy. The pus was rapidly controlled by the exhibition of boric acid.

Dangers.—Vesical irrigation in strumous or tubercular pyelo-nephritis in male subjects can be, and often is a very dangerous procedure.

The obstinate irritability of the bladder, though mild at first, and the presence of pus and *débris* in the *neutral* urine—for it soon passes the acid stage—often forces the practitioner to discard drugs, and to have recourse to the sound or to irrigation of the bladder, under the supposition that he is dealing with an intractable subacute cystitis.† Often as not by this means subacute cystitis is set up, the epithelium is extensively denuded by the various antiseptics or caustics recommended for the cure of cystitis regardless of its cause, and the way is thus unpaved for inoculation. Worse still, septic changes are

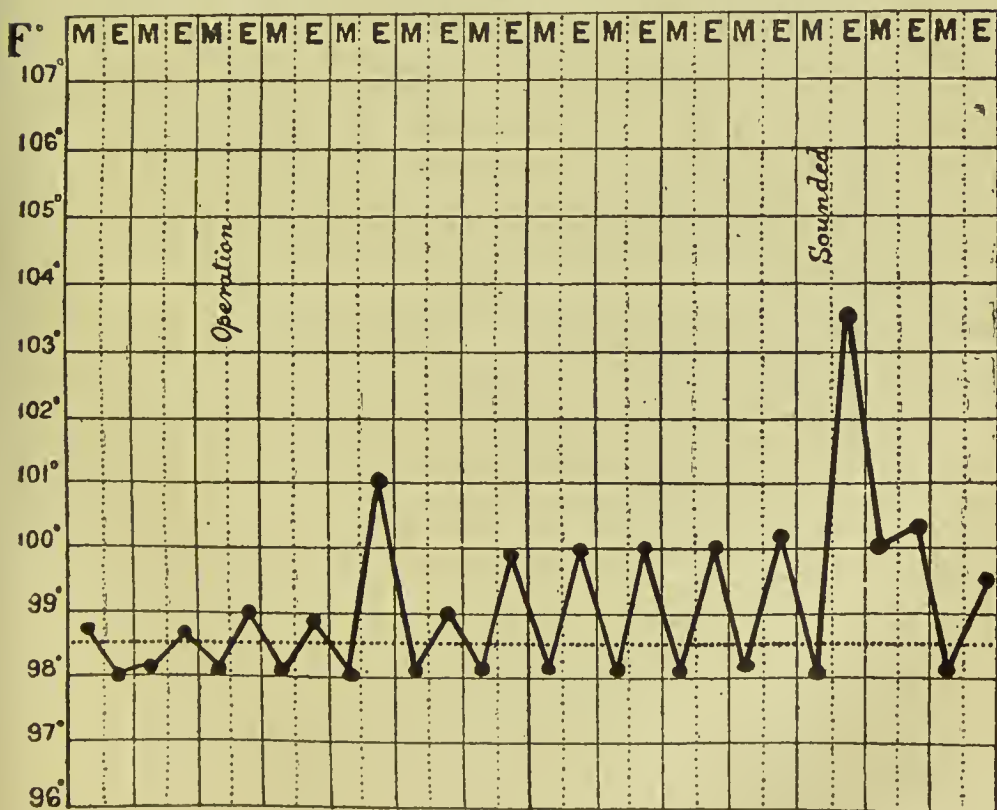
* In tubercular pyelitis it is far otherwise. Compare next section.

† This mistake happens much more easily when the renal tubercle is "latent," and does not show signs of life until the bladder gives the alarm.

often induced by septic catheterism, and what before was tinder is now fire. I have seen grave reactions, partial suppressions, and in one case uræmia, vomiting, and death follow examination of the bladder in advanced tubercular cases. Of the more moderate consequences of rough instrumentation in the early stages of scrofulous pyelitis I may mention the following case, which I was permitted to watch by my colleague, Mr. Swinford Edwards, under whose care the patient came :

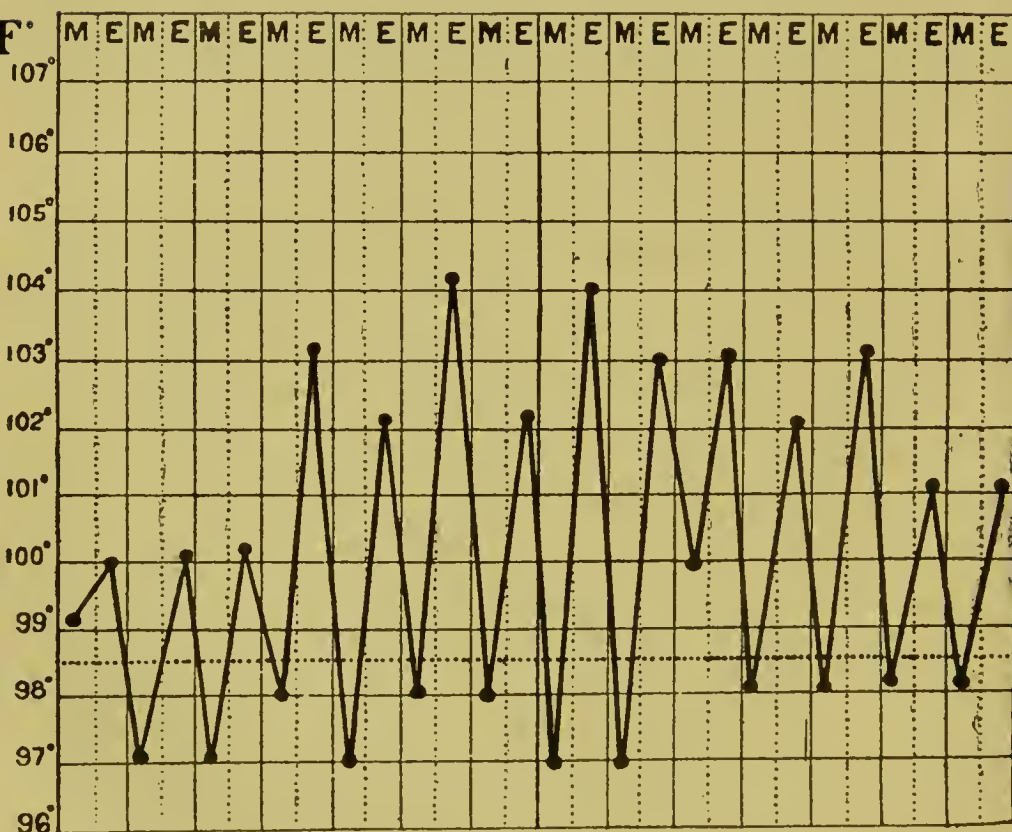
CASE 35.—E. J., aged 21, a strumous-looking young man with much brown hair, heavy straight eyebrows, large blue eyes, long eyelashes, eroded teeth, fair skin ; no family history of phthisis. Up to fifteen months ago he was in perfect health. He had had no venereal disease, nor had he practised masturbation. He noticed at this time a frequency of micturition, accompanied by a burning pain at the subpubic ligament after the act. The frequency was every hour and a half in the day, and thrice during the night ; there was no obstruction to the stream. Suddenly the symptoms were aggravated. He had to pass water every hour in the day and three or

FIG. 7.



four times at night. A month after the onset he passed a quantity of dark red blood without clots. There was no extra pain on passing it. It gave no relief either to the frequency or to the pain. For six months he remained in this condition, being quite unable to engage in any work because of a spasmodic pain which used to seize him in the supra-pubic region, and "draw him double." This spasm was at once subdued by micturition, and the relief continued for half to three quarters of an hour. In nine months after onset he noticed a pain in the right side, as if "his kidney was being grasped in a giant's hand;" also occasionally a darting pain ran down the right ureter into the bladder, stopping at the pubic arch, and never entering the right testicle. He considered this pain as an indication that he wanted to urinate, for micturition relieved it at once. No vomiting. He came under my colleague's care a year after the onset; his

FIG. 8.



frequency was then three or four times a day and once at night; urine was 1012, clear, neutral, no blood, $\frac{1}{10}$ mucus-pus. He was sounded, and his temperature ran up to 101° forty-eight hours afterwards (Fig. 7). After this he was certainly worse; the temperature oscillated to 100° every night.

Ten days after a gentleman who was summoned to see him in the absence of my colleague thought he would sound him, whereupon the temperature rose

to 103.6°, and a chocolate deposit appeared in the urine. The temperature dropped next morning, and resumed its usual markings (compare Chart, Fig. 7).

I was now asked to cystoscope the patient, and declined on account of the renal disturbance, and because on examining the rectum I found, as I thought, a small pea-sized deposit of tubercle buried in the substance of the left lateral prostatic lobe, pressure upon which developed supra-pubic pain. Testes healthy and large; I could find no tubercle bacillus in the urine. The frequency declined from eighteen times in twenty-four hours to six times; the temperature gradually subsided and became normal, and the bladder was thereupon examined with electric light. No pain was experienced on passing the instrument. The bladder seemed healthy in every part except the base, which was spongy and gelatinous, and at the right ureter, where there was a furred, superficially ulcerated patch. There was no reaction. I heard subsequently that the temperature became again raised, that the tenderness of the right kidney increased, that an abscess formed and was evacuated by nephrotomy. When I saw the patient some days after the operation all frequency of micturition and pain had subsided.

There is no doubt that the untoward event in this case was due to the fever of instrumentation. I can without difficulty multiply examples, but I need not. Fig. 8 shows a deeper temperature marking of a precisely similar case. Nephrectomy was successful in this instance, but the temperature oscillated in lower ranges from the pyelitis of the ureter which was left behind.

Treatment of the Frequency of Pyelitis.

Therapeutic.—I am convinced that the vesical irritability in a large proportion of the non-tubercular cases is directly due to the inflammatory conditions co-existing in the bladder and prostatic urethra, and that appropriate irrigation of these sections of the urinary tract will relieve the patient of a large amount of his or her discomfort. The most reliable of the solutions recommended is the iodoform emulsion (*vide* p. 85), or instillations of nitrate of silver or mercury sublimate into the deep and prostatic urethra (*vide* p. 147).

You may attempt to lessen the discharge of pus in non-tubercular cases by means of boric acid and saccharin by the mouth—

℞ Acid. Boric., gr. x.
Ammonia Benzoeat., gr. xv.
Pot. Bicarb., gr. v.
*Saccharin, gr. v.
Tr. Cardamom. Co., ℥x.
Inf. Serpentry, 3j.

* This saccharin is not added for mere sweetening purposes, but for its thera-

or by the exhibition of sodium hyposulphite in half teaspoonful doses mixed with buchu tea, or salol in pill, gr. v—xxx, thrice a day, or Hilton's mixture (p. 155).

I have occasionally found *Lycopodium clavatum* of use. I employ the tincture made, I believe, by an homœopathic process, and I administer it in half to teaspoonful doses thrice a day. I do not understand its action.

CASE 36.—J. A—, æt. 38, presented himself, thirteen years or more ago, at St. Peter's Hospital, complaining of passing water every ten minutes, accompanied by great pain both before and after the act. He had supplied himself with an urinal. He was wretchedly emaciated, and seemed in constant pain. His history was as follows:—Twelve years ago he was a strong and healthy man, 11 st. 4 lb. He suddenly felt pain across the small of his back, and began to pass blood, soon having to strain violently whilst making water. The straining was doubtless due to "clots." He came under my colleague, Mr. Teevan, and was treated as an out-patient for six months. He was frequently sounded, but no stone could ever be discovered. In 1880 the pain and frequency of micturition were so great, and his health so much undermined by his loss of rest, that Mr. Teevan performed a perinæal cystotomy upon him. No morbid condition could be found in his bladder. The blood stopped after that operation for one year, then the bleeding recommenced, and he again became an out-patient. The pain, frequency, and bleeding increased, the latter becoming almost constant, and he underwent a second perinæal cystotomy, but the irritability of bladder and pain remained undiminished. Seven and a half years ago a third and last perinæal cystotomy was undertaken, in the hopes of affording him relief from a life of almost unendurable misery. His bladder was allowed to rest for seven weeks, and he left the hospital, passing water by the perinæum. No alleviation, however, was experienced as regards pain or frequency, only the drain of blood ceased. Since this time, until he came under my notice, he took six grains of morphia a day (24 grs. of Extract. Opii, or over a fluid ounce of the tincture) to ease him. Even with this he was up all night, straining to get the water away, catheterism affording no relief. There is a distinct history of syphilis, but his children, seven in all, have escaped. My notes of him are as follows:

Present condition.—"The man is an old worn-out man at thirty-eight. He is extremely emaciated, and bears the stamp of prolonged suffering upon his face. His constitution is evidently affected by his trouble and the morphia habits he has acquired. He passes water into an urinal every ten minutes, suffering pain both before and after the act. One ounce of residual urine is found in the bladder. It is slightly acid and albuminous. The prostate is small and hard, feels warped as to the position of the lobes; on pressing it the patient feels pain at the end of the penis like a knife running into him." Finding his suffering so great, and that his frequency prevented him sleeping at night, I injected ten drops of 20 per cent. solution of cocaine into his prostatic urethra, and the next day he assured me he had passed a splendid night; that the irritability was diminished, and that he

possessed capacity for controlling muco-purulent urine. It often upsets the stomach, and it is better to omit it after a week or so. It is sometimes very valuable. (Cf. author, 'Hospital Gazette,' April 7th, 1888.)

did not wish to make water for two hours after the injection of the cocaine. He promised to leave off his morphia, and I provided him with a small bottle of a 10 per cent. solution of cocaine, with instructions how to use it. He soon became excited and passionate, feeling the sudden withdrawal of the opium, but after a severe struggle he overcame the habit. The cocaine lost its effect in a few weeks, but not before he had discarded his urinal. His general condition, however, had greatly improved, and his pain had been somewhat reduced. He passed water only six or eight times at night, and every hour and a half in the day. I now placed him on tincture of lycopodium, in half-drachm doses, and the frequency gradually diminished. He was less often up at night, his appetite returned, and he gained flesh. Describing the effect of lycopodium, he said "that half an hour after he has taken it he feels it at the end of his penis." Be this as it may, the man greatly improved, and seemed to continue to improve under the influence of the lycopodium; but I lost sight of the case, and as it was in precystoscopic days I could not tell you accurately what was the matter. I believe the origin of the trouble was pyelitis, perhaps scrofulous; that the bladder at first sympathised, but secondarily became involved by the gradual extension to it of the disease. The three perineal cystotomies undoubtedly relieved the bladder, and when the patient came under my care the urinary passages were in a chronic state of catarrhal irritability. The morphia induced incontinence, or a partial loss of vesical control, which kept up this catarrhal condition. The cocaine, by removing the necessity for morphia, broke the vicious circle, and the lycopodium finally aided the work of restoration, which nature often completes by cicatrisation.

Operative Treatment.—Change of air into a dry climate or to the seaside often does much good. This is especially the case in the pyelitis preceding or following confinement, or in that form which is caused by parametritis.

Calculous Pyelitis.—In calculous pyelitis, the removal of the cause of the mischief by means of nephrolithotomy, or nephrectomy if the kidney is too damaged to be useful and the companion gland is excreting sufficiently well for the needs of the body, is the proper and surgical treatment for the symptom as well as for the disease.

Tubercular Pyelitis.—If a case with symptoms suggestive of tubercular renal disease with pyelitis did not improve—and they often do most markedly with change of air, fatty food, and sandal oil by the mouth—an exploratory lumbar nephrotomy ought to be done, the capsule split, and the pelvis opened through the renal structure. By this means we should at once clear up the diagnosis and remove any stone that was the cause or the effect of the trouble. By opening into the pelvis the lower ureter would be placed at rest and the stream of irritating urine would be diverted, and it is remarkable how often this procedure relieves the bladder, reducing both frequency and pain. By splitting the capsule the intra-

glandular tension would be reduced, and the pain consequent upon the backward pressure would be subdued. Moreover, the wholesale destruction of the secreting tissue might be averted by relief of injurious tension. By drawing the kidney into the loin and fixing it there, any fluid deposit could be evacuated at once, and a way left for the subsequent sloughing out of the more solid foci.

Unilateral Pyelitis from Pressure or from Ascending Inflammation.

In cases of unilateral pyelitis, and perhaps in the bilateral form of this disease, when the drain is commencing to affect the general health of the patient, the ureter may be attacked and washed out either from below or above. Surgery is extending in this direction, though but as yet very little is on record of this departure, and I myself have only had the experience of one case. There is no doubt, however, that the procedure now in vogue of nephrectomy for incurable unilateral pyelitis is unsurgical and unnecessarily severe, for the kidney which is removed is, perhaps, working satisfactorily and sufficiently well, and the ureter, which is the *fons et origo mali*, is left behind. It is argued that when the tide of urine is permanently cut off by nephrectomy, the diseased channel is placed in a state of physiological rest with ample drainage, and should therefore heal, but the cure is accomplished at the expense of serious mutilation. The attack and cure of a pyelitis without nephrectomy is, I believe, a large and fair field for the surgery of the future.

Systematic Irrigation of the Ureter from above.—The safety with which the pelvis of the kidney can be opened, the ease with which bougies or blunt-pointed catheters can be passed down the ureter from above,* and the facility with which

* In describing a highly instructive case of nephrotomy for the relief of sudden total suppression of urine occurring some time after nephrectomy, Mr. Willy Meyer, of New York, says: "As soon as the ureteral canal had been opened through the loin a mass of sero-pus, large shreds and coagulated pus and blood escaped. The same material absolutely corked the ureter for a distance of at least two inches. A thick probe pushed down with some force entered for perhaps one half inch, but then was stopped. It did not strike a stone. Evidently an abscess previously encapsulated in one of the pyramids had perforated into the pelvis of the kidney. A thin Nelaton catheter was now introduced into the ureter downward alongside its wall, which was stretched with the help of two mouse-tooth forceps, and through it warm borie water was forcibly injected by means of a hand syringe. Thus I succeeded, little by little, in washing out the débris backward towards the pelvis of the kidney. When the injected water returned clear the lower end of the catheter was cut off obliquely and pushed towards the

this canal can be washed out through the loin, permits us to hope that the treatment of unilateral pyelitis by systematic drainage from above will before long be an accepted and well-established procedure.

Systematic Irrigation of the Ureter from below.

Is the vesical orifice of the ureter wide enough to admit medium-sized catheters?

It sometimes occurs on suprapubic cystotomy that while the operator's finger is searching the base of the bladder, it discovers a gaping ureteral canal; occasionally the opening is so large that the tip of the digit is admitted. I have been present at the post-mortem* of a case in which one of my colleagues here, had washed calculous débris up and down the ureter during a litholapaxy by means of an evacuator ball. I have heard also of another case which occurred at the University College Hospital. My colleague, Mr. R. Harrison,† wrote a very suggestive paper upon the possibility and utility of washing out the pelvis of the kidney through the bladder, and narrated two cases presenting symptoms of nephritic calculus, in which, after determining the absence of calculus in the bladder, he employed the lithotritry evacuator, and small pieces were washed out, presumably from the ureters. This can but seldom happen, because the vesical sphincter or orifice of the ureter is *rarely* so atonic as to admit the influx of water. I have seen many unilaterally enlarged ureteric openings in pyelitis by means of the electric cystoscope; they were gaping wide enough and were sufficiently flaccid to admit a medium-sized blunt-pointed catheter. That catheterisation of the male ureters

bladder as far as possible, and a number of syringes full of water flushed down into that viscus which had not been distended by a natural flow since three days. The patency of the ureter was thus re-established. That not the slightest obstacle was any more in the way of a normal kidney drainage was proved by a rubber bougie which corresponded to the ureteral calibre, and was passed down into the bladder in its entire length without any resistance."

* "P.M.—An enormously fat woman, with thick-walled abdomen. Running up each rectus, but more especially up the left muscle, was a damson-coloured extravasation of blood. At the top of the bladder, which had given way extraperitoneally, the wall was unusually thin; there were two or three frays on the mucous membrane, which was for the most part healthy-looking; the posterior wall was hypertrophied. The right kidney was much atrophied, acutely inflamed, and on opening it the ureter and pelvis were both found full of the washings of the lithotritry, the ureter was greatly dilated. The left kidney was in a state of extreme hydronephrosis, and sticking in the upper end of the ureter was a date-sized stone, long axis vertical."

† 'Lancet,' March 10th, 1888.

can be performed after supra-pubic cystotomy is accepted. Axel Iversen* has gone so far as to perform supra-pubic cystotomy in order to collect the secretion of the kidneys separately before removing one of the kidneys.

This ureteral catheterisation is more easily accomplished by placing the patient in the Trendelenberg position,† a posture which I invariably adopt in supra-pubic cystotomy, for the trigone is then not covered by blood and urine, but being the highest point in the bladder can be sponged and kept dry, so that the ureteral orifices lie directly in view.

We may take the first step, then, of our argument, and assert that catheterisation of a pyelitic ureter is *easily* accomplished in the male through a supra-pubic opening.

In the female, catheterisation of the ureters has been and can be done without a cutting operation, though for continuous irrigation of these canals the Bozemann operation is apparently the best. Thus Simon‡ in 1875 practised direct cathe-

* Axel Iversen, 'Cent. für Chirurg.,' 1888, No. 16.

† A glance at Fig. 9 will show the Trendelenberg position, which is not sufficiently known or appreciated in England. The attendant's shoulders are

FIG. 9.



replaced by a cross-bar apparatus, or by a Verity's patent epicycloidal window-holder; in private practice the patient can be inverted over the top of an ordinary small iron bedstead, or at a pinch over an ordinary long broom turned upside down and fixed by the handle to the end of the table, this in conjunction with hip pillow to raise the patient's pelvis.

‡ Simon, 'Samml. Klin. Vortr.,' 38.

terisation through the dilated urethra. Grunfeld* in 1876 used Simon's method with the help of an endoscope. Paulik† of Vienna claims to be able to be guided by certain folds, and does not dilate the urethra. He has succeeded in passing hollow sounds in the ureters 150 times in the dead subject and 50 times in the living.

Dr. Newman, of Glasgow,‡ in 1883 devised and used an electric endoscope for the female bladder, and found when the bladder was well illuminated the orifices of the ureters were easily seen and could be catheterised.

It has been said that the ureters can be catheterised under the electric light of the cystoscope. Dr. Brunner has attempted to catheterise the ureters by means of a modification of the cystoscope, which carries a separate small channel on the convex side of the shaft. This channel terminates just below the window, and can also be used for changing the water in the bladder. It is occluded by a mandrel, when the instrument is introduced. The mandrel later is extracted and replaced by a minute English catheter or an elastic metal sound. Brunner thus succeeded in pushing the catheter into each ureter of a female patient exposed by the light, but failed to do the same in the male. He has had no opportunity to continue his trials in this direction. When the catheter or sound is in the ureter, the instrument itself may be slipped back over it. It may be possible to do this in the male in the future; I do not think it is feasible at present.

It has been proved further that the ureteral canals tolerate the sojourn of catheters. Schæde in a case of uretero-vaginal fistula left catheters in the ureters for seven days.

Messrs. Albarran and Lluria§ assured themselves by experiments on dogs that catheters could be left in both ureters for many days without producing any renal resentment. They applied their method to a woman suffering from tuberculosis of the bladder, in order to leave the bladder at rest, and the catheters remained in the ureters for ten days.

The next step is to prove that washing of a pyelitic canal can be curative.

Bozemann || was, I believe, the first to draw attention to the treatment of chronic pyelitis by irrigation through a

* Grunfeld, 'Wien. Med. Presse,' 1876, Nos. 27, 28.

† Cf. Greig Smith, 'Abdominal Surgery,' p. 561.

‡ 'Glasgow Med. Journ.,' Aug., 1883; also 'Lectures on Surgical Diseases of the Kidney,' 1888, p. 415.

§ 'Soc. de Biologie,' Juin, 1891.

|| 'International Journal of Med. Sciences,' p. 259, March, 1888, vol. 95.

wound exposing the orifice of the *female* ureter by an incision through the bladder base (kolpo-uretero-cystotomy).

He gives a remarkable instance of a woman, aged 34, who in the fourth month of her last pregnancy (fifth) began to suffer pain in the right lumbar region. It was variable in character and increased by exercise; at times it was acute and radiated to the groin, and down the thigh toward the knee. More frequently the pain was dull and constant, and confined to the lumbar region. The urine was constantly stained with blood, and deposited much pus. Partial suppression of urine, severe paroxysms of pain, nausea, vomiting, and high fever had accompanied the passage of two calculi. The general symptoms had lasted three years when the patient came under Dr. Bozemann's care. She was much emaciated; her complexion was sallow, and her mucous membranes very pale. She was extremely weak, and suffering almost constant pain in the region of the right kidney. The urine was of a reddish colour, acid in reaction, contained albumen, and deposited a thick sediment consisting of blood and pus. The uterus was large, retroverted, and slightly prolapsed.

"On May 6th the patient was anæsthetized, placed on the left side, and the anterior wall of the vagina exposed and made tense by means of my dilating speculum and perineal elevator. The point of a narrow-bladed scalpel mounted in a long handle was made to enter the mucous membrane on the right side about one inch and a quarter below the cervix uteri, and three quarters of an inch away from the median line, and a circular piece of the septum was removed, forming an opening into the bladder sufficiently large to admit the index finger. The orifice of the ureter was then discovered, and bloody urine was seen issuing from it. The vesical and vaginal mucous membranes were brought together at the border of the opening with a continuous catgut suture. A No. 8 French olive-tip catheter was then passed into the ureter, and entered the pelvis of the kidney without meeting any obstruction. Warm water was now injected through the catheter by means of a small piston syringe. About a drachm at a time was forced into the pelvis of the kidney, and then allowed to escape. The irrigation was continued until the fluid which came away was free from blood. The catheter was left in place for thirty-six hours, and the urine was collected as it flowed directly from the pelvis of the kidney. When examined by Dr. Coe, the pathologist of the hospital,

it was found to be alkaline in reaction, and to contain a large proportion of blood, pus, and crystals of triple phosphates. Bacteria were also present in great numbers. A week later the catheter was again introduced, and allowed to remain twenty-four hours. Its continued presence in both instances occasioned nausea and vomiting, and a good deal of paroxysmal pain.

The vesical and vaginal mucous membranes having united at the border of the opening by first intention ten days after the operation, systematic treatment of the pyelitis was begun. Every day a flexible olive-tip catheter was passed into the ureter, and the pelvis of the kidney was irrigated with a warm solution of bichloride of mercury 1 : 20,000. A rubber tube was attached to the lower extremity of the catheter, in order to lengthen the instrument and to connect it to the nozzle of the syringe more readily. A small hard rubber syringe was used. At first I injected only about one drachm at a time; afterwards I found that the best guide as to the quantity of fluid which should be injected was the sensation of the patient. Whenever the pelvis of the kidney was distended, a peculiar and characteristic pain was felt; the fluid was then allowed to escape, and the injection repeated until the washings were colourless and free from sediment. As the treatment progressed the size of the catheter employed was gradually increased to a No. 13, and, if any useful purpose would have been served, I believe I could have dilated the ureter to a much larger size. As a result of the spiral course of the ureter, the catheter as it entered rotated on a longitudinal axis. A given point on its surface, indicated by a mark, was seen to describe a complete circle. As the catheter passed toward the pelvis of the kidney, this point moved from right to left, and while the instrument was being withdrawn the rotation took place in an opposite direction. I have verified this observation in other cases, and found that in the left ureter the direction of the rotation of the catheter is reversed. Whenever the catheter was passed, the urine retained in the pelvis of the kidney flowed out. The quantity thus removed was found to be variable. If the patient had been standing or walking immediately before the introduction of the catheter, there was found little or no accumulation of urine in the pelvis of the kidney; if she had been lying down, a considerable quantity was removed. At the beginning of the treatment this was sometimes as much as fifteen drachms. I was also able to measure the capacity of the pelvis of the

kidney. The injection of fluid was continued, as already described (but with a larger syringe), until the peculiar pain was felt. The fluid was then allowed to escape, and measured. The capacity of the pelvis, determined in this manner, was at first twenty-one drachms, but was at last diminished to five drachms, which, from my observations in other cases, I believe to be about normal."

6. *The Urine contains Pus. Cystitis.*

Cystitis of all grades and of every origin must of necessity produce frequency of micturition, and this in proportion to the severity of the attack. The bladder may be affected in its entire extent, or the inflammation may be localised. We need not consider the effects of a general cystitis, for it is easily understood how an inflammation of the entire surface will cause an intolerance of the smallest amount of urine in the bladder;* nor is there any necessity to draw your attention to the irritability which results from a localised cystitis of the neck of the bladder from extension of gonorrhœa backwards. It is, however, important that I should impress upon you the fact that all the symptoms of cystitis, with its accompanying frequency of micturition, may be induced by a very small part of the bladder wall being implicated. I have seen a fair number of female cases in which the irritability of the bladder was so urgent, and the other symptoms of cystitis so marked, that they mimicked stone, but on cystoscopic examination a half or three quarters of the entire bladder was seen to be quite healthy, the surface to be brilliant in its glisten, and the mucous, submucous, and muscle coats to be uninjected and freely movable in expansion and contraction. But at one spot, usually on the lateral wall, there was a dull, blood-extravasated, infiltrated patch, which marked the site of invasion of an inflammation from some pelvic source; and this localised cystitis was able in itself to cause all the symptoms of a general and an acute disorder.

* In the severest form of the acute cystitis the patient lies on his side in bed with his penis in the bottle or hanging into an utensil. Every minute or minute and a half a call comes to void urine, and this is accompanied and accomplished by a violent bearing down, "like childbirth," or as "if the entire body was coming through the fundament." The patient is doubled up with the agonising spasm of the bladder, and as the trickle of highly alkaline dirty drab or blood-coloured urine flows along the canal, it gives rise to the awful sensation of boiling lead being forced along the urethra.

CASE 37.—Mrs. H—, æt. 39, was sent to me by Dr. Grigg, of Mayfair, on account of obstinate irritability of the bladder. The family history was very unfavourable, for both her father and mother had succumbed to phthisis. This fact, coupled with the severity of the bladder symptoms and the greatness of her sufferings, had caused the case to assume an unusually grave aspect. On electric cystoscopy the entire bladder was seen to be perfectly healthy, with the exception of the lower part of the left lateral wall. Here, though there was no ulceration, yet the surface was injected, the epithelium had been shed, and the dark, dulled, furred condition pointed to invasion from some pressure or inflammation of an adjacent pelvic viscera. This proved correct, for on appropriate treatment she recovered from her bladder symptoms in three weeks.* Though this localised cystitis was probably due to extension of inflammation from tubercular disease of the left tube or ovary, yet the case serves to illustrate my point.

I could weary you with examples of localised cystitis by invasion from ordinary ovaritis, metritis, &c., for this complication is not uncommon, and there are several cases now in Mary Ward in which localised cystitis has followed prolapse of the uterus, with rectocele or cystocele, or has ensued upon gonorrhœal infection, or upon the pressure of the foetal head in pregnancy. It has also not infrequently happened that the uterus and appendages of such cases have been examined by competent medical men and have been pronounced as “normal” or “healthy,” or the patient has been told that these organs were exercising “no influence on the bladder.”

I cannot help believing that we are rather apt to found our diagnosis of the health of the uterus upon our sense of touch as the patient lies on her side, and pay but little heed to the tilt or drag of the uterus when the vertical position is assumed. Moreover, I suspect there are many slight inflammatory conditions of the uterus and appendages, affecting the bladder by sympathy or contiguity, which are unrecognised by the sense of touch.

On the other hand, I believe we are apt to concentrate too much attention upon the uterus, and to attribute other pelvic troubles to it, of which it may be innocent. I have seen cases operated upon and treated for uterine disease where definite bladder trouble was present. One especial case impressed me very greatly.

CASE 38.—A lady who had been labelled as a case of prolapse of the uterus, and who had had two perineorrhaphies performed by a well-known

* As these pages were going through the press I received a letter from Dr. Grigg to the effect that Mrs. H. was now suffering from tubercular disease of the spinal cord. The ovaries could be felt inflamed and matted to the surrounding parts and adherent to the side of the bladder. The bladder trouble had subsided.

specialist in order to relieve great straining and frequency of micturition, accompanied by much pain in the vulvar region, was brought to me by one of our old students. He explained that he had just taken over the charge of the case, for the patient had dismissed her previous medical attendant. She had been bedridden for a year on account of her bladder sufferings. Neither operation had benefited her in the slightest, for both had failed—"the womb came down as before," and her bladder misery seemed to increase rather than to diminish. The first thing my friend did on his introduction was to sound the bladder, discovering at once a large calculus. I crushed this, and the lady resumed her former active habits in a fortnight.

Treatment of Cystitis.

The treatment of the acute form must be carried out regardless of the cause, for in all operative work about the bladder inflammation must be first subdued before any instrumental interference is commenced.

In the acute stage there are three powerful agents in reducing the severity of the attack—1. Rest in bed with elevated hips. 2. Free imbibition of diluents. 3. Anodynes administered by the bowel.

The elevation of the hips drains the bladder, and withdraws it from the pressure of the intestines. The diluents render the urine copious. Those which are the most reliable are the following "teas," made of linseed,* buchu,† or *Triticum repens*.‡ Those who can obtain it fresh and good can rely upon Ext. *Collinsonia Canadensis*§ (℥xx), and Ext. *Stigmata Maidis*|| (ʒss). They are often invaluable. Taken alone or added to these should be a sufficient amount of alkali to render the urine less irritating. Citrate of potash or Liq. Potassæ are the most useful. Prof. Keyes speaks well of the following combination :

℞ Liq. Potassæ ʒij.
Ext. Hyoseyami ʒj.
Syr. Aurant. Cort.,
Aquæ Cinnamom., āā ʒiij.

M. Sig. A tablespoonful in some diluent every eight hours.

Anodynes act best by the bowel. A suppository of watery

* Linseed ʒiij, liquorice root ʒj, a thick slice of lemon peel (avoid lemon juice), water ʒx; infuse 4 hours. Take 3 pints a day.

† Buchu: put 4 to 8 teaspoonfuls of the bruised leaf into a pint of boiling water, leave for half an hour, strain. Take a pint a day.

‡ *Triticum repens*: boil 2 ounces of the root for a quarter of an hour in a pint of water; strain when cold. Take one pint in 4 doses in 24 hours.

§ *Collinsonia Canadensis* (*Stone Root*).

|| *Stigmata Maidis*, "*Corn Silk*," the stigmata of maize (*Zea Mays*).

extract of opium, gr. ss., or of morphia, gr. $\frac{1}{4}$ — $\frac{1}{2}$, combined with extract of belladonna, gr. $\frac{1}{2}$ —j, is the most serviceable.

In addition to these remedies, you employ a hot hip bath from 100°—105° for a quarter of an hour two or three times daily, and order hot applications to the perineum and pubes either by Leiter's coils (Appendix J), hot flannels, spongipiline, or poultices frequently changed. Hot rectal enemata twice or thrice a day are most soothing, besides being of value in keeping the lower bowel clear. Laxatives and fluid diet complete your methods of treatment.

In subacute stages the balsams are of use—sandal, copaiba, turpentine.

The frequency of chronic cystitis in the male is more difficult to allay. It is usually dependent on some abiding source of irritation, such as stone, stricture, enlarged prostate, and with the removal of the cause an amelioration of the frequency is obtained. The ordinary vesical injections should be used, for I believe these will be more serviceable than drugs. In employing injections "the changes should be rung," for the bladder often becomes apathetically indifferent to any form of wash which is continued for long. The most reliable of these are, Sir H. Thompson's fluid—(1) Glycerine, 2 oz.; biborate of soda, 1 oz.; water, 2 oz.; add half an ounce to four ounces of warm water. (2) Boroglyceride, ʒij—ʒiij, to 4 oz. of water. In irritable bladders (3) iodoform emulsion (p. 85). If the urine is alkaline and depositing phosphates, (4) acetate of lead, gr. j, to 4 oz. of warm water; or if stronger injection is required, add ten drops of acetic acid to the last solution. If there is an abundant mucous deposit, (5) a solution of tannic acid gr. j to 1 oz. In abundant muco-pus, (6) alum gr. xx to the pint, or sodium salicylate ʒj to the pint, or salicylic acid $\frac{1}{2}$ per cent., cautiously increased. Instillations of a solution of perchloride of mercury, 1 in 10,000, are of use (Guyon). Half a drachm is the amount to begin with, increasing to a drachm. The catheter should be passed just through the compressor urethræ, and the fluid injected into the bladder. None should be permitted to escape into the anterior urcthra, for here it causes inflammation. Before making an instillation the bladder must be emptied. I advise the weaker solutions to be used at first, 1 in 10,000 or 1 in 20,000. As tolerance is obtained, 1 in 5000 may be used. In many people with chronic cystitis, the sublimate solution causes a good deal of suffering. In severe and intractable cases, prolonged drainage by a boutonnière opening is requisite.

The cure of cystitis in women will usually depend upon your power of curing metritis, uterine displacement, a peri-uterine or an ovarian inflammation; for the treatment of any such complications I must refer you to your text-books. At the same time vesical injections are of great value.

Much stress, and deservedly, has been placed upon resting the female bladder in the aggravated forms of cystitis when drugs and injections fail.

(a) *Digital dilatation*.—Digital dilatation of the female urethra is so readily and safely performed, and is followed often by so much improvement, that it is looked upon, unfortunately, as a specific, and is often employed quite regardless of the cause of the cystitis. If the bladder prove to be tubercular, I do not know of a more mistaken or a more disastrous method of treating such cases* (cf. p. 198). If, however, this form of disease has been excluded, dilatation of the urethra with swabbing the tender portions of the bladder with nitrate of silver through a tube is of use.

Dr. More Madden has found that marked relief in chronic cases of cystitis has followed forcible dilatation of the urethra, and the induction by this means of temporary incontinence of urine, accompanied by free application of glycerine and carbolic acid to the mucous membrane. The pain resulting from this can be relieved by cocaine. Two or three applications at intervals of ten days may be required.

(b) *Buttonholing or vaginal cystotomy*.†—Cystotomy should not be too long delayed when necessary. In women the bladder is easily opened from the anterior vaginal wall, the vesico-vaginal septum is stretched by means of a vaginal bivalve speculum, a grooved staff is inserted into bladder, the groove laid on the floor and kept in the middle line; the knife is entered a quarter of an inch behind the neck of the bladder, and the wound is kept patent by the daily passage of the finger or a catheter, or the vesical mucous membrane may be stitched to the vaginal at the time of the operation to ensure patency. "There is but little difficulty in closing such a fistula; the difficulty—if any—lies in keeping it open" (Taylor).

There is no obstruction to the stream; (b) the urine contains pus.

* Incontinence of urine not infrequently results.

† Emmet advocates this step so strongly that he says, "Our means for curing cystitis are limited to a single procedure, that of vaginal cystotomy, and all other means yet known to us are but adjuvants." Quoted from MacNaughton Jones, 'Diseases of Women,' 5th edition, p. 587.

Catarrhal Ulceration of the Bladder.

This is often a most obstinate condition to treat, and a most distressing disease to suffer from. I am convinced that the chapter of urinary disease which embraces the clinical characters of the catarrhal ulcer greatly needs revision.

I believe many cases have been misunderstood. Instances apparently of chronic tubercular ulceration have been raked together, classified with straightforward examples of catarrhal disease, and from these ill-assorted materials the clinical features of the catarrhal ulcer have been constructed.* The most frequent cause of non-tubercular ulceration is protracted chronic cystitis, and I have had ocular proof of its causation in a large variety of cases, such as stone, stricture, enlarged prostate, fracture of the spine. There is, however, a very difficult and but little understood form of idiopathic (?) ulceration, which seems to me to be divided by an extremely thin partition from that which is induced in "scrofulous" or tuberculous patients by some transient and causeless inflammation. It is, perhaps, encountered more often in women than in men, and in young adult life than in old age. The symptoms are at first those of subacute or chronic cystitis, with frequent micturition, which often is paroxysmal and accompanied by vesical spasm. The pain in the male is usually perineal or supra-pubic, but it does not remain fixed: it extends along the ureters, into the loins, upper parts of thigh, and groins, testicles, back of legs, even soles of the feet. It is of an acute burning or scalding character, increased by exercise, cold weather, constipation, alcohol, or any error in diet. In the female there is often a burning sensation at the meatus, in the hollow of the great trochanter, or over the sacro-iliac synchondrosis, as well as in the supra-pubic region. The urine is faintly acid or neutral, pale, murky, slightly albuminous, and deposits a fine layer of pus; sometimes it contains

* The tide is setting now in another direction. Directly a cystoscopist finds an ulceration of the mucous membrane of the bladder; and no apparent cause, such as stone or stricture, can be discovered for its existence, this ulceration is pronounced tubercular, and the patient is dropped as incurable. Still worse, if some especial injection should be used and the ulcer heal, as it sometimes does on the application of astringents, that particular solution is considered and recorded as germicidal, and its use is held to be indicated in urinary tuberculosis without regard to the stage, grade, or extent of the disease. There are cystoscopic pictures even which show the healing of tubercular (!) ulcers under the action of certain injections, when more probably the difference in the size noted at the second examination was due to the smaller amount of medium employed; for the ulcer edge expands and contracts in proportion to the distension of the bladder,

thick ropy mucus. Shreds of lymph and débris often float in it. If the ulcers be coated with phosphate material the urine may be clear. The ulcerations, which are not infrequently single and small, are easily seen with the cystoscope. They are usually found on the posterior wall towards the base of the bladder, their edges are not much indurated, their bases are uneven and blood-stained, though no blood may have been in the urine.

Phosphate of lime may often be seen deposited upon these ulcerations, and they then appear under electric light as if they were sprinkled with half-wet plaster of Paris. I have even seen these ulcerations when the urine appeared *clear* to the naked eye, and only contained microscopic evidence of pus, but this is rare. It is more than probable that those cases which were so frequently encountered by Sir Henry Thompson, and reported by him as "Digital exploration. Nothing whatever found, or nothing found except a scale of phosphatic matter adherent to bladder,"* were ulcerations such as I have mentioned. It is certain that the finger can easily overlook an ulceration unless it is covered with phosphate of lime, whilst the eye under electric light detects it at once.

Causation.—Where stone, stricture, or enlarged prostate are present there can be no difficulty in settling the origin of the lesion. But as regards the causation of idiopathic vesical ulceration it is otherwise. Personally, I can give you but little help in the matter, and nothing but the electric cystoscope can supply you with a definite diagnosis. I cannot avoid the conviction that the spontaneous form of catarrhal ulceration, the scrofulous ulcer, and the tubercular ulceration

* Sir H. Thompson, 'Tumours of the Bladder,' 1884, p. 30; Cases 2, 3, 4, 5, 11, 15, 22, 26, 30, 31, 35. Examples:

"CASE 22.—J. F—, æt. 27. Very severe symptoms for four years without known cause. Exploration, March 12th, 1883. I found the upper part of bladder coated with thin phosphate deposit, and detached a quantity, which proved to be thin floeculent membrane with adhering phosphates, and was scraped off with my finger-nail, and became free in the bladder and was removed with the forceps. I at first supposed it to be a slender villous growth. It was examined by Mr. Eve, who described it as above. Tube was retained one day; the wound did not heal. He had orchitis, and suffered much for a long time. Ultimately there was some improvement."

"CASE 30.—H. B—, æt. 23. During the last two years subject to pain, frequency, and slight hæmaturia, little influenced by treatment. It was associated with other symptoms of an anomalous kind. Much care was bestowed upon the case, and no explanation of it was discovered. Exploration June 28th, 1883, with Dr. Walker, of Lowestoft. *Nothing whatever found.* Tube retained eight days, the wound healed, and he left in a month with less frequency of micturition but with constant pain in the penis, and apparently little benefited by the operation." Cf. case later on, Mrs. C—, p. 206.

of the bladder, represent varying degrees of low vitality of the vesical tissues, either inherited or acquired, the more destructive form depending upon the addition of the bacillus and its microbic poison. I will give you first an illustration of this class of case, which will impress you with its tediousness, its painfulness, and our frequent powerlessness, and then an example of the value of general treatment without any resort to the curette.

CASE 39.—This patient, W. F—, æt. 29, first came under my notice as an out-patient at St. Peter's Hospital in July 1884. He was then 22, and complained of pain in the perinæum and gleet, apparently the remains of his first gonorrhœa contracted six months previously. He had suffered from epididymitis four years before, of causeless origin. He referred his feelings to the neck of the bladder, and believed that they were increased by flatus in the rectum; his frequency was then normal, urine 1012, acid, turbid with the pus of gleet. In a month's time he suffered pain in the middle of the penis after making water at the peno-scrotal angle.

At the commencement of 1885 blood appeared in the urine and the following were the symptoms noted:—The urine comes free until near the end, when it suddenly scalds him, and he feels himself bound to stop; after this he feels that there is still something left in the bladder, and on attempting to pass this it proves to be blood. "It seems to him that there is a raw part in the bladder, and that at the times when he is straining the blood comes from this place. Sometimes it heals by forming a scab over it, and if the scab is not too big he is comfortable; should, however, the scab get too large, then the pressure of the water forces the scab off and blood appears, and he gets ease." I give the above because this is the feeling which the patient has had all through his long and wearisome case.

Besides this he has imperious calls to micturate, and a settled frequency. He was sounded; no stone was found.

In March, 1885, he complained that he had tremendous pain on micturition in the glans and in the perinæum, but has no pain between the times of making water.

As he was losing weight and as I was uncertain as to the nature of the case, I admitted him into the hospital under my late colleague, Mr. Walter Coulson, in May 1885. The urine was 1012, acid, albuminous, and contained muco-pus.

Median cystotomy was performed by Mr. Coulson and the bladder was explored, but no cause for the symptoms could be discovered. There was a good deal of constitutional disturbance, and the temperature oscillated for some time between 103° and 99°. Three days after the operation, whilst coughing, he passed a large quantity of blood and clot. He gradually obtained more and more control over the water, and left the hospital not at all relieved by the operation; in fact, he was saddled with a fistula which proved very difficult to heal, and which long remained a source of uneasiness and discomfort to him.

On returning to me he was able to hold the water two hours in the daytime, but had to get up every hour at night. When the bladder was extra full it dribbled away. He passed a quarter of a pint in the daytime at each urination (five ounces), and when he had evacuated four ounces of this a sudden pain seized him which stopped the flow. The remainder then leaked off.

One and a half years after the onset, January, 1886, the fistula was quite closed in and the bladder held eight ounces; there was still a visible deposit of pus. No pain in either side, but he had the pain as usual at the middle of the penis before and after micturition. Blood appeared in the urine once a month.

March, 1886.—Patient had a very sharp attack of pain in the back in the region of the kidneys; pus also reappeared in the urine in increased quantities. This attack gradually subsided on taking sandal oil.

April.—Sudden attack of bleeding from the urethra, not of a bright colour, followed by pus from the canal two or three days after.

July.—The patient returned stating that on lifting a heavy weight blood of a bright red colour came with the urine. He passed water every hour (three ounces at a time); it was albuminous, with flaky pus in it.

December, 1886.—After exerting himself at his work he passed a quantity of blood for three successive micturitions, the frequency being every half-hour. On lying down the water cleared. Subsequently there was an irritation all along the urethra as if that tube was raw. This is easier if he has not to pass wind by the bowel.

January 10th, 1887.—Fresh hæmorrhage, with dark brownish-black clots; rest relieved it. It is now noted that the left globus minor has a slight thickening in it suspicious of tubercular onset, but this did not increase; urethral discharge appeared and the bladder capacity at once diminished to two ounces. He reports that he is now in constant pain. Two glands under the jaw have enlarged.

In May the perineal wound reopened; went for an holiday, returned holding three ounces.

June, 1887.—Urethritis and bubo not consequent upon connection. The bubo went down without incision.

I now lost sight of the case until April, 1890, when he called upon me with a letter from Dr. Hare, of the Post Office Department, asking what the cause of the intractable form of subacute cystitis was, and whether he was fit to continue in the service.

It appears that the patient married in March, 1888, feeling at the time free from his trouble. He had no pain on connection, but is quite positive that he did not ejaculate any seminal fluid; he believes that something keeps it back, for it oozes away fifteen minutes afterwards.

In November, 1889, the old symptoms began to re-assert themselves, and his present condition in April, 1890, is noted as follows:—"If he holds his water after his sensations warn him that the bladder is full, he gets a shooting pain from the orifice of the bladder to the glans penis; sometimes he experiences the same feeling if the cold strikes him; this pain is at once relieved if he urinates, and until the viscus begins to fill—i.e. for half an hour—he is tolerably comfortable; it then recommences and increases in intensity as the water accumulates in quantity, finally he is forced to make water to obtain relief; this takes place every three quarters of an hour day and night. He holds two ounces usually. If the water is clearer he can hold a little more. He notes also that the pain is more intense if the urine seems clearer and yet darker. He has no pain in the side, and has not seen blood for six months; the stream is a good one, it is full and forcible, there is no suprapubic pain, the testes are quite free from deposit."

Cystoscopy.—"The surface of the bladder is swollen and gelatinous in parts. To the outer side of the orifice of the left ureter a deep crackly ulcer with an inflamed red edge is visible, it reminds me of the irritable anal ulcer. My letter to Dr. Hare, in answer to his, was as follows:—"On

the left side of the bladder and behind the left ureter is a quarter-inch long crack with an ulcerated and blood-effused edge; the remainder of the bladder is swollen and gelatinous and contracted, the mucous membrane has been in part removed.

"Can the ulcer be healed? Yes.

"Can the vesical capacity be much increased? No, not without danger of rupture.

"What is the nature of the ulceration? Scrofulous, not tubercular. It is scrofulous in its obstinacy, but there is no active tubercular disease.

"Prognosis—good comparatively."

I subsequently came to regard the ulceration as catarrhal. I taught him how to wash his bladder out with lactic acid solution $\frac{1}{3}$ to 1 per cent., and this relieved his pain, and the urine was passed clearer, but the improvement was only transitory.

May, 1890.—Sometimes he has bouts of pain so that he can scarcely move, for if he does so a tremendous pain starts from the entrance of the bladder and shoots along the penis. This occurs regularly. The pain is worse if the urine is of a dark brown colour. On using an iodoform injection the pain is much increased, and blood comes away.

November, 1890.—Sandal oil now makes him "leak," and his shirt getting wet his trouble is much aggravated by the cold.

December, 1890.—He notes that when he injects plain warm water into his bladder a certain quantity, three ounces, causes a spasm, and the whole is evacuated with a rush. In bed he can lie on either side, but in turning over he has extreme pain shooting all along the canal. Prostate normal, no deposit. Pressure on the left and right sides of the bladder causes pain.

April, 1891.—Came to me in great distress. Nothing had relieved him, and I was at the end of my resources, for I had tried all known bladder remedies and the usual calmatives and narcotics, and he refused operation.

A friend of his now advised him to take a mixture of sulphuric and sulphurous acid in water. After a week he felt a great relief, and now, although a year has elapsed since he commenced this solution, he is still much improved. The frequency is the same, but there is now little or no pain. The frequency is once every hour in the day, and every two hours at night. I gave him a solution of lactic acid to test if it was merely the acid which relieved him, and though he felt better with it for two days than without it, the urine became tinged of a blood colour, the pain returned, and became so great that he discontinued its use. After leaving off the lactic acid internally the pain gradually lessened.

Here is a more hopeful case which I obtained earlier, and treated, I submit, better than the last.

CASE 40.—This patient, a healthy-looking man of 34, consulted me in June, 1889, on account of a constant pain which was felt behind the testicles, and which was increased after micturition. The following history was given:—"Some months ago he contracted a mild urethritis from his wife, apparently of catamenial origin. This lasted some time, but was subdued by Condy injections. The pain he now complains of thereupon commenced. The onset was very sudden, and was accompanied by an intense desire to pass water every quarter of an hour. The frequency continued for two or three days, and then gradually subsided, but the pain remained. His stream now finishes with white phosphatic material; there is no blood. He passes water every hour

in the day, but only rises once at night. He has had pain on connection just where the usual crutch-pain is felt. He has passed small soft crumbly white stones, and when "the white sediment stuff" comes away the pain is more severe. He fancies that he does not pass all his water. One brother died of phthisis. The frequency is variable; sometimes it is every hour to two hours to two and a half hours in the day, but only once at night. The prostate is large and cupped, and the symptoms and history made me diagnose a chronic prostatitis, but the frequency was not explained by this, and I therefore examined with the cystoscope.

June, 1889.—Two ulcers were seen on the back of the bladder. One was just like a healing vaccine sore with a crust upon it, and the other was like a true Hunterian chancre; it had a flattened base and was situated upon an upraised gelatinous swelling. The bladder was slightly inflamed and trabeculated. The mucous membrane of the urethral orifice was wrinkled; the whole base was of a deepish red. The introduction of the cystoscope hurt him; it apparently traversed a tender and inflamed prostate.

September, 1889.—Has been to the sea-side, and is much improved. Sandal oil had no effect upon the pain, but painting the perinæum with iodine eased him somewhat. He can hold the water for four or five hours now. Finding him so much better, I examined him to ascertain if there was any change corresponding to it in the bladder. The urine contained oxalates, triple phosphates, and a very few pus-cells.

Cystoscopy, September, 20th, 1889.—On examining the bladder, I saw a small upraised round ulcer on the posterior wall; it was like the split-pea chancre. To the left side of it was a deeply injected patch like a mass of red fishing-worms. Another and a similar patch was noticed on the right lower posterior wall. The entire base was "rucked up" and had a reddish gelatinous look. The urethral orifice was pleated as before. I had used a four ounce distension.

Remarks.—Here is definite ulceration of the posterior wall, but extremely small, and apparently in the healing stage. There is no frequency, merely a little smarting on the completion of urination.

I lost sight of my patient until March, 1890. He then returned stating that since September, 1889, he had been getting on fairly well—so well that he thought there was no need for medical treatment. Thus the post-scrotal pain had been much better, the white deposit had vanished, the frequency of micturition was every three hours in the day and only once at night; there had been no blood, and the water was clean. Three days ago, however, he felt "another ulcer was forming," for the pain has gradually returned, the first part of the water was slimy and yellow, and the latter part very shreddy; the frequency is every two hours, but it is not increased at night. Sandal oil was exhibited for a week, and cleared the water, but still mucus appeared in the first part of the stream, the pain was not easier for the oil, the frequency was only a shade better.

Cystoscopy, March, 26th, 1890.—The bladder is fasciculated and bleached. What I took at first sight to be diverticulæ, I found, by the swirls of urine proceeding from them, to be the mouths of the ureters; they looked like small craters. I have never seen such even-edged flush-with-the-surface openings before. The surface has lost its sheen. It looked like an old stricture bladder. The inter-ureteral bar is deeply congested, and there is a distinct shallow boat-shaped surface behind it, which is superficially ulcerated. He improved after washing with lactic acid.

June, 11th, 1891.—Has been better ever since November, 1890.

October, 1892.—As the sheet was going through the press I wrote to

inquire about the health of this patient, and found the improvement had been maintained.

Treatment of Catarrhal Ulceration.

The difficulty of treating these cases successfully is often extreme. You may pass through the urinary pharmacopœia, both as regards the selection of medicines and injections, and yet fail to employ a single remedy which affords more than passing relief. Some patients are much relieved by morphia suppositories, others improve without drugs at the seaside or in dry and warm climates. I usually employ sandal-oil capsules, and a bladder wash, iodoform (p. 85), every other day. If I see that the ulcerations are covered with lime phosphate, I use lactic acid, gr. $\frac{1}{2}$ to 10 per cent.,* and have by this means given some relief. I have had great success from scraping off the phosphatic encrustation, so that when an operation is permitted I advise a boutonnière and free use of the carefully cleansed forefinger nail.† The artificial finger-nail which is made to fit on the forefinger is unsafe, for it is apt to slip off in the bladder, and its removal is troublesome; besides, no instrument unguided by sight can vie with the natural nail, controlled by the sensitive pulp, for exactness of manipulation. In severe cases, supra-pubic cystotomy and careful and systematic curettage by means of caissons‡ is indispensable.

* I begin at $\frac{1}{2}$ per cent., and rarely use above 1 per cent., for the acid is most penetrating and painful.

† Sir Henry Thompson reports a case which illustrates the danger of asepticism in scraping. "J. C. D—, æt. 43. Pain, frequency, and repeated attacks of hæmaturia more or less during five years; symptoms now severe, without ascertainable cause. Exploration, April 4th, 1883. Found nothing but very notable roughness at the top of the bladder like phosphatic encrustation, but on attempting to remove it with finger-nail found it was an altered condition of mucous membrane, as if a congeries of varicose vessels with thickened walls. Placed a tube in the wound. On the fifth day signs of pyæmia appeared, and he died on the 16th. No autopsy permitted."

‡ A caisson is an open cylinder, which is used for laying the foundation of river bridges. It is sunk over the site selected for the position of the supporting pier, and when it has bottomed the contained water is pumped out, leaving the bed of the river exposed for foundation-laying. In the bladder I use this caisson method for the removal of small growths, the excavation of encysted stones, the accurate marking out of prostatic fibromyomatous growth, and the curettage of ulcers. I perform supra-pubic cystotomy, and before the water has left the bladder I take a Ferguson vaginal speculum, and sink it over the part to be attacked. The water is then siphoned out, leaving the base dry. With an electric lamp on the forehead the work can be proceeded with, not only with exactness, but also without that unnecessary and brutal violence which is often used when the finger is the sole guide to the vesical offender, cf. 'Brit. Med. Journal,' Nov., 1892. Compare Appendix S.

(b) The urine contains pus, but there is no obstruction to the stream.

Tubercular Ulceration of the Bladder.

I have already alluded to this subject (p. 40), and have given a brief outline of the clinical history of vesical tuberculosis in its earliest stage. As I shall have again to introduce the subject under the heading of "Physical Irritability" (p. 198), my remarks upon it now must be curtailed.*

Every disease has its strongly-marked salient feature, its special characteristic. In benign vesical growth it is symptomless hæmaturia, in renal stone it is nephritic colic, in vesical stone it is penile pain, in stricture it is painless obstruction to the stream, and in tubercular vesical ulceration it is irritability of the bladder. The principal figure in the hall-mark of vesical tuberculosis is extreme frequency of micturition.

The Character of Irritability in Vesical Tuberculosis.

The onset irritability depends greatly upon the character of the invasion. If the infiltration be of the diffuse type, the irritability is sudden and excessive, like that of an ordinary acute cystitis; but this form is uncommon as far as my own experience goes, and it is more often that the softening and ulceration of the discrete aggregations of tuberculosis will be met with. In this localised variety of the eruption the patient notices that the calls to empty the bladder are gradually increasing in frequency. In a few days the night's rest will be broken into once or twice by the summons. Finally the average limit of the first stage will be reached. The bladder will be emptied every two hours in the day, and every two and a half hours at night.

It is the distressing frequency by night that is the great characteristic of the disease. This nocturnal irritability combined with painful micturition is often sufficient to raise your suspicions of tuberculosis, for it points to some focus of persistent irritation, and the only other cause in the young for this is stone. But the nocturnal frequency of stone subsides on prolonged rest, whilst that of tuberculosis is usually unaffected.

* I trust to deal with the entire subject more fully in a monograph on tuberculosis of the urinary organs.

I have mentioned two hours in the day, and two and a half hours at night, as being the usual length of time the bladder rests quiescent in the middle stage of vesical tuberculosis. But this is only an average duration. Every week or few weeks, according to the weather, occupation, and severity of the disease, flushes of cystitis will sweep over the doomed mucous membrane and the frequency will greatly increase; the urine will be passed every three quarters of an hour to every hour and a half in the day, and from every hour to every hour and a half at night. It is sometimes even worse than this. On the defervescence of these attacks the former time-standard of irritability will be resumed and probably slightly curtailed, for the congestion and softening consequent upon this epiphenomenon will increase the ulceration and expose more of the submucous tissue. Little by little, unless cicatrization ensue, the mucous membrane of the bladder will be eroded, and finally a three-ounce stiff, inelastic, unsheathed reservoir will be left to receive the supply from both the extra-active kidneys. To this condition I shall refer again immediately (p. 199).

Causation of the Frequency.

The cause varies with the stage of the disease. Thus, the initial frequency of *primary* vesical tuberculosis may be due, and often is, solely to the reflex irritation of the submucous deposit. Later on this is aggravated by flushes of cystitis, and still later by an irritating tide of acrid caustic urine from a similarly diseased kidney. Finally, when the frequency reaches its climax, it is due to the presence of half an ounce to two ounces of puriform urine which stagnates as a residuum in the bladder from the atony caused by the interpenetration of the muscular wall by inflammatory and tubercular infiltrations.

Notes on the diagnosis.—The diagnosis of tubercular vesical disease would be easy enough if we were not often confronted by another and an allied form of ulceration which simulates it most closely by producing an equally distressing irritability of the bladder. I refer to ulceration of the bladder in the so-called scrofulous subject, an ulceration which may be primary and spontaneous in its appearance, or which may follow upon gonorrhoeal prostatico-cystitis. With the electric cystoscope I am unable to diagnose between them, for a vesical ulceration which appears in patients urinating non-bacillary

urine, but whose family history, whose appearance, whose sluggish circulation, and indifferently healing tissues proclaim them to be prone to tubercular processes, is visually the same as those ulcerations* which manufacture an abundant supply of tubercle bacillus, and which occur in patients whose clinical history is pathognomic of rapid urinary tuberculosis.

The teaching and practice of the present day is to regard those infiltrations which were called scrofulous as tubercular. Theoretically this is quite correct, for the specific micro-organism of the disease—the bacillus tuberculosis—is found in both diseases, but clinically there is a wide separation between ulceration in the “scrofulous” and tubercular ulceration; for the former tends more often to cicatrisation and cure than the latter.

I will place before you three cases as illustrations of the extremes of these two conditions.

CASE 41.† *Vesical irritability for eighteen months; electric cystoscopy; localised ulceration of bladder; healing; vesical health for two and a half years.*—Miss H— was brought to me by Dr. Street, of Westgate-on-Sea, on March 13th, 1889, for cystoscopy on account of obscure vesical symptoms. The patient was a well-grown girl, æt. 16. Up to September, 1887, although somewhat ailing in health, she had been fairly well. She then found herself obliged to rise two or three times at night; gradually supra-pubic pain was experienced, and blood appeared in the urine. She was sounded in February, 1888, with a negative result. The mother died of phthisis, and the patient suffers much from chilblains.

The examination was conducted under an anæsthetic. The bloody urine withdrawn was of a typical renal colour. The washing out of the bladder was done most gently, and when the return wash was perfectly clear six ounces of boracic solution were injected. When four ounces had been introduced the patient became restless and the vesical resistance appreciably increased. The cause both for the jactitation and the resistance was understood when the

* Clinical experience would seem to indicate that the tubercle-bacillus is no ordinary bacterium, such as may enter and affect any organism without distinction. It would seem rather as if infection occurred only where a definite predisposition exists, or where a considerable quantity of the virus is introduced. This predisposition may be local as well as general. The local predisposition may perhaps depend mainly on antecedent inflammatory change. A general predisposition is attributed to scrofulous subjects especially. There are persons whose tissues exhibit a certain frailty or susceptibility to injury that makes them particularly liable to chronic inflammatory disorders. It is, however, not at all uncommon for the term “scrofulous” to be applied to individuals actually affected with tuberculosis, as well as to those who are only predisposed to it. (Zeigler, p. 9, 176, sect. v, transl. by D. Maenlister.)

† This case was reported in ‘Elect. Illum.’ ed. ii, p. 131, and though I do not generally care to repeat histories as illustrations, yet sequels are usually of great value, and that of this particular case is now to hand. It forms with the history an important illustration of the subject.

electric cystoscope was passed, for the mucous membrane was seen to be tightly stretched and deeply injected in every part, the vessels being large, prominent, and numerous, and in patches resembling the straight vessels of an acute iritis. Several trunks had been over-stretched, and from the damaged vessels there issued many tricklets of blood which ran in parallel lines down the sloping posterior wall, like rain down a window-pane—a useful lesson of the effects of even slightly over-distending an inflamed and contracted mucous membrane.

At the left ureteral orifice and slightly behind it was seen a patch of blood-red extravasation, whilst towards the right base was observed an everted-edged ulcer with an irregular base, the mucous membrane in the immediate neighbourhood being greatly thickened and gelatinous-looking. She was placed on sandal oil, weak lactic acid injections, and a laxative.

June 16th, 1889.—Letter received from Dr. Street:—"For some weeks Miss H— remained much the same, but lately there has been gradual and steady improvement. The frequency in the night has for the last week been once only. The water contains less blood and mucus; there is little or no pain. Menstruation has been regular and normal. General health is satisfactory." The young lady went on uninterruptedly well until June, 1891, and then, though apparently in perfect health, she began to suffer from frequent and painful micturition. At this time she happened to be in Holland, and the doctor considered it due to some slight local irritation of the urethra, but both Dr. Street and I were uneasy about the symptom. However, these symptoms proved transient, and passed off completely. In the early part of 1892—that is, three years after I had examined her, and four and a half years after the onset of her first symptom—Dr. Street again brought the patient to me with recurrence of the urinary trouble. My notes of the interview are as follows:—"Some months ago Miss H—, being in perfect health, had to nurse several children through an attack of measles, and her health 'ran down.' Thereupon she noticed a very slight pain at the urinary meatus upon micturition. This continued until five or six weeks ago, when, without any warning, a profuse hæmaturia with clots occurred. The bleeding was checked in a day, but frequency of micturition set in, and it was accompanied by pain at the meatus after micturition, supra-pubic pain being felt before, and relieved by, the act. She returned home from Holland a few days ago and has been losing blood at Westgate ever since. Latterly she has had an ache between the shoulder-blades. She is anæmic and listless."

Cystoscopy.—"There was much *fresh* blood in the urine, and the bladder needed a good deal of washing. On examination three very deep, sharply cut, blood-stained, thin-edged ulcers were seen on the posterior wall. The base of the bladder looked healthy; the entire surface was reddened by recent hæmorrhage, and swollen. The capacity was not more than two ounces." She was under chloroform, which she took well. She returned to her home, but did not improve. I received a letter to the effect that in September there was certainly less blood and less pus, and she could lie on her side in bed without pain, which she had not been able to do before, but that her temperature had become raised and also oscillatory. Pain was now complained of in the left side, and became almost unbearable. A swelling appeared in the renal region, and the tumour was opened on the 11th October. It was found that the entire kidney had been converted into a loculated abscess. The vesical irritability diminished, as it nearly always does in this disease upon opening a renal collection and diverting the tide of acrid puriform urine from passing over the diseased mucous membrane of the bladder.

This history teaches us that a vesical ulceration of eighteen months' duration gradually healed and the patient recovered. She might have been called cured. All goes on well until her health becomes deteriorated; the old mischief thereupon lights up, hæmorrhage ensues, her rallying powers are still further undermined, and left-sided pyelitis terminating in caseous pyelonephritis and abscess is the result. Any fever, and notably influenza, breaks down cicatrised ulcers in the same way. As contrast cases I place before you the following, the first as an example of the disease in youth, the second in old age.

CASE 42.—This patient, J. S—, who is 23 years of age, was sent to me by Dr. Gristock for cystoscopy. You remark how thin and lightly built he is. Up to four months ago he asserts that he was in perfect health. At this time he noticed that his shirt was stained with blood, and found that a few drops of blood were passed at the end of micturition. After a little time he experienced a slight pain in the glans penis at the finish of making water. This pain has increased gradually. It is now very severe unless he drinks a quantity of fluid to produce a large flow of water.

Occasionally he has a little pain across the loins and in the testicles. Six weeks ago frequency of micturition appeared. An analysis of his present symptoms is as follows:

Blood.—This usually amounts to a few drops of fresh blood after the close of urination; it occurs once a week, unless he is taking a hæmostatic. He has only twice seen it intimately mixed with the urine.

Frequency.—At first this was every hour and a half in the day and once at night. Now it is every hour in the day and three times at night. He also has a great inclination to go to stool every time he passes water, especially if he has held the urine for some time.

Quantity.—Quarter of a pint of urine is passed at a time.

Stream.—This never suddenly stops; it possesses some force, and finishes well.

Pain.—None while the stream is flowing; at the close of the act there is a glans pain exactly like that induced by stone. A little irritating feeling at the end of the penis acquaints him with the fact that he is full, and unless he passes water, this feeling increases to actual pain.

Family history.—Father died of phthisis, also grandfather on father's side; mother healthy; brothers and one sister healthy; the sister is extremely stout, is married, and has six healthy children.

Present condition.—"Residual urine amounts to half an ounce; the stream appears to me full and yet not of normal force. The catheter and cystoscope are tolerated without pain, therefore there is no deposit in the urethra. The bladder holds seven ounces comfortably; the trigone is not swollen nor heaped up, its surface is merely injected, the vessels running in long parallel leashes antero-posteriorly.

On the posterior wall are a number of blood-red patches of extravasation, with little white flakes of necrotic tissue peeling off, but still attached. This condition is especially noticeable towards the right ureteral opening, which appeared to have the mucous membrane rucked up on each side of it by subjacent inflammatory adhesion. On turning to a healthier part (the left

lateral base), the vessels were seen to be very prominent and full, and along their track were isolated, minute, rounded extravasations, whose colour was of the brightest red. Their abrupt edge contrasts very markedly with the broad stripes of similar character on the posterior wall, for there the red shades into a buff before it merges with the yellow of the normal-coloured mucous membrane. No true ulceration visible.

The prostate felt normal, the testes also; the urine was murky with pus of an acid reaction; tubercle bacilli were discovered in abundance."

Three weeks after this examination I again passed the cystoscope, and expected to find the bladder better, for after the exhibition of sandal oil the symptoms had been greatly relieved. "The instruments meet with a check at the triangular ligament. The bladder looks healthy over a large extent, especially on the left side, but at the right ureter there is still a rucking up of the mucous membrane. Lower down towards the trigone there is a large shallow ulcer which, when the bladder is as full as it will hold—six ounces—has a semi-colourless edge; directly, however, some of the contained medium was allowed to escape a deep red blush appeared, and projecting inwards the ulcer assumed the shape of a Hunterian chancre. It is evident to me that I am dealing with a rapid urinary phthisis, probably secondary to some extra-urinary focus, and that no treatment will avail."

Subsequent note.—Dr. Sansom kindly examined the patient's chest after this, and reported that there was a consolidation at the left apex. I sent him to the seaside, but he went from bad to worse, and died of acute pulmonary phthisis seven months after the onset of the urinary symptoms, and three months after he first came under my notice.

CASE 43. *Rapid senile tuberculosis of the bladder.*—Samuel P—, æt. 56, a stick and cane dresser, was admitted into the London Hospital under my care on June 1st, 1891, complaining that he had a difficulty in micturition and that he also suffered pain in the act.

History.—Five months ago he was in capital health; he never had had any venereal disease of any description, never urethral discharge; there is no phthisis in the family. He has married twice, and has had twelve children. Four months ago he began to experience difficulty in getting his water away; this increased so much that he had to strain and even to scream in his efforts to empty his bladder. The urine used to come in a very thin stream, it was very light-coloured and clear, but it scalded him greatly all along the canal. He had no pain only when he started to pass water, and then "it was like pouring hot liquor through him;" after micturition he was easier. He was forced to pass water every two hours in the day and eight or nine times at night. Three months ago the left testicle swelled and then partially subsided. In a month's time, however, it again swelled until it reached its present size. Six weeks ago a clot of blood appeared, which blocked the canal and hung from the meatus; he pulled it out, and the stream was re-established; the clot came towards the close of the act. He has had a clot of blood like this three or four times. He has been losing flesh rapidly.

Status presens.—An emaciated man of fifty-six, with a drawn and anxious expression of face. He is passing water (half an ounce at a time) every half-hour day and night, with much straining, and with scalding pain all along the urethra. The urine is amber, acid, 1018, trace of albumen, no sugar, contained urates, pus, blood, and tubercle bacilli in large quantities, with clumps of tissue. The left testis is swollen and red, there is a fluctuant abscess over it the size of a goose's egg; this was incised, and two ounces

of pus evacuated. On cleaning out the abscess cavity two or three small points of pus were seen coming through the tunica vaginalis testis. These openings were enlarged, and the epididymis was found to lie directly under them, and to be full of caseous material breaking down. The entire epididymis was therefore carefully scraped out and the cavity packed with iodoform gauze. Prostate small but shotty.

Cystoscopy.—White, filamentous, sloughy pieces of necrotic debris float from all parts of the vesical surface. I gave a very unfavorable prognosis. (The friends removed him, and I learnt that he died very shortly after.)

Differential diagnosis.—The diagnosis between catarrhal and tubercular ulcerations of the bladder can only be made with certainty by watching the progress of the case or by finding the bacillus tuberculosis in the ACID* urine, or by injecting the urine into the peritoneal cavity of animals—the guinea-pig.† This, however, makes no difference in the treatment of the disease, only in the prognosis.

Treatment in Prophylaxis.

You are taught, and wisely so, that gonorrhœa, or urethritis, forms a great predisposing element in urinary tuberculosis—that it permits a latent diathesis to develop itself, and prepares a suitable nidus for the growth of the bacillus. This knowledge should make you very careful of allowing such discharges to continue in those with a scrofulous tendency or with a well-marked tubercular family history. It should also check any attempt at over-instrumentation and unnecessary injection of the posterior urethra. But there is to my mind a decided error which is gaining ground in our text-books, and which will be repeated before long by scissors-and-paste authors until it is a literary fact.

* It is difficult to find the tubercle bacillus in acid urine, and almost impossible in alkaline secretion.

† Dr. Thorkild Rovsing, 'Die Blasenentzündungen,' Berlin, 1890; No. 2, p. 140. Mr. Jacobson ('Operative Surgery,' p. 710) also points out how bacteriology can help the surgeon in difficult cases. He says, "My colleague, Dr. Washbourne, has thus cleared up two obscure cases for me this year. One, a delicate woman of thirty-two, with a tubercular history, was sent to me by Dr. Forty, of Wotton, in Gloucestershire, with obstinate cystitis and irritable bladder. The endoscope and digital exploration showed swollen and hypo-vascular mucous membrane, but detected no ulceration. Wiping over the mucous membrane with solution of silver nitrate (gr. 40—3j) was followed by very great relief, lasting over two months on two occasions. At my request Dr. Washbourne injected some of the pus containing urine (in which no bacilli could be found) under the skin of a guinea-pig. No result apparently followed, but when the animal had been killed one of the nearest chain of glands was enlarged and caseating. A few undoubted bacilli tuberculosis were found in it." This and the other case will be found in 'Guy's Hosp. Rep.,' 1890.

The statement to which I object is that "in primary tuberculosis of the testes, prostate, or the bladder in men infection takes place through the urethra, and the whole process resembles what occurs in inhalation tuberculosis, and in which the disease manifests itself, not in the mucous membrane of the bronchial tubes, but in the parenchyma of the apices of the lung."* This view is to my mind not only absolutely needless, but mere laboured fancy; it is a resolute attempt to mutilate the feet of fact until they can be forced into the Chinese boot of theory. A large number of my cases of male primary vesical and prostatic tuberculosis have neither had coition nor venereal disease.

I have examined and treated little girls with undoubted vesical tuberculosis. Guyon has had eight similar cases, which were reported by Dr. Boursier.† Moreover, statistics show how rarely tuberculosis of the female genitals is encountered, and how frequently phthisis is communicated by the breath,‡ saliva, food, or other means.

CASE 44.—This man, whose age is twenty-six, has never had gonorrhœa, nor has he ever noticed any urethral discharge. He comes complaining of testicular swelling, from which he has suffered three years, and you will at once notice that his epididymi are stuffed with crude tubercles. The large bossy infiltrations are only too visible under the scrotal skin as the testicles hang writhing in their sacs from the action of the sudden exposure. His family history is absolutely free as regards tubercle. His wife died a year ago from phthisis, and we learn that he was constantly with her and nursed her throughout her illness. She never suffered from womb or bladder trouble. Now this patient has no urinary implication, and yet this case might be used as an illustration of direct urethral infection through the prostate. To my mind it is much more simply accounted for by the constant inhalation of the bacillary poison from his wife, and the implication of the testes from some primary deposit in the shape of a packet of caseous bronchial glands (Virchow). I do not know of a single instance of a man with urinary tuberculosis communicating the disease to his wife. You might contend

* Senn, 'Principles of Surgery,' p. 544, originally mooted by Cohnheim, and elaborated by Verehere, Fernet, Strümfell, and others.

† Boursier, 'De la Tuberculose de la Vessie.'

‡ Cf. Heron, 'Communicability of Phthisis,' examples of which are placed in Appendix P.

that a man with tuberculosis of the testes, prostate, and bladder base would hardly have either sexual power or desire. The following case will disprove this view.

CASE 45.—This patient, J—, æt. 37, whose left testicle was ablated here some two years ago, is now in the last stage of urinary tuberculosis. I have had to curette a tubercular prostatic deposit through a perinæal incision for him, and yet three months before this operation he was able to procreate a son without infecting the wife. The history is too lengthy to introduce now, but a reference to the baby must be made.

On March 19th, 1889, six months after the curettage, the wife gave birth to a puny unhealthy male child, and it was noticed by the midwife that the infant had a swelling in the nape of its neck. Three weeks later the mother brought the baby to me, and I made the following note :—"Mother appears healthy. The infant is very small, and its skin withered. There are no marks of congenital syphilis. There is a large swelling in the nape of the neck which feels semi-fluctuant; it is obviously due to disease of the cervical vertebræ, for the child moans directly its head is moved, and on gently rotating it there is a distinct grating. The right elbow is distended with fluid, and the bones can be moved loosely and with grating in the joint." The child did not take the breast well, and it succumbed a few days after.

After some difficulty I was permitted to make a superficial examination of its joints. The swelling under the trapezius was a large cervical abscess due to disease of the subjacent vertebræ. The right elbow was disorganised and full of pus; the bones were dislocated. The right parotid had swollen a day or two after I first saw it, but of this, at its death a week after, there was no trace. The left knee-joint was also greatly swollen—not by fluid, but by an enlargement of the bones entering into the formation of the joint. The mother subsequently developed a small abscess in her breast, but with this exception she remained in fair health. There was no suspicion of the nature of syphilis, nor was there in my own mind any question of the parentage of the infant.

Dangers of Injudicious Treatment.

Septic infection and excessive zeal sum up the dangers. I will admit that for one not using the cystoscope the sound in doubtful cases is most necessary. Let me, however, urge on you all possible gentleness and cleanliness in sounding. Tubercle resents the slightest manipulative roughness. Put your patient to bed, boil the sound, use it well warmed and oiled, and with as light a hand as possible. I have already mentioned the danger of introducing septic material in washing out the bladder (p. 84). A solution of perchloride of mercury, 1 in 20,000, and gradually increased in strength to 1 in 10,000, relieves. Guyon asserts that instillation into the neck of the bladder of half a drachm of the same drug, 1 in 5000, is productive of good results (p. 123). No strong antiseptic wash will help you to stamp out tubercle. Germicides will only increase the cystitis and widen the field for invasion.

Iodoform has no curative powers. Washing out the bladder with boiled water will relieve the pain in the early stages, and often check the blood. Above all things let me advise you not to explore digitally and then salve your conscience with the assumption that the drainage will do good. Drainage gives no permanent relief unless it be undertaken in very early stages, and even then it very often leaves an obstinate perinæal fistula; whilst in women with tuberculous bladder it not infrequently produces total incontinence of urine. Opium, sandal oil, sea air, and occasionally washing out the bladder will often work wonders. If these measures fail, there is still the cauterisation of the tuberculous deposits under electric light (compare Appendix S), or the more unsurgical method of wholesale curettage through a supra-pubic incision to fall back upon; but any form of treatment is unsatisfactory, and the patient, if he lives, passes through the various stages of the disease until he dies exhausted, or the tubercular infiltration obsolesces or burns itself out (p. 198).

(c) There is no obstruction to the stream, but "prostatic" threads are present.

Any irritation of the prostatic mucous membrane excites its physiological function of reflexly causing an evacuation of the contents of the bladder. Thus, injection of any irritating fluid into the prostatic urethra, or the application of any caustic to the same part, produces an intense desire to pass water. When the stimulus is constant, as in congestion or inflammation of this surface, irritability of the bladder results. The main pathological causes of frequency of micturition under this heading are gout, catarrh of the membrano-prostatic urethra, masturbation, and primary tubercular deposit in one or both prostatic lobes.

Gouty Inflammation of the Neck of the Bladder and Prostatic Canal.

It is true that there is a peculiar and a distressing irritability of the bladder met with in old people of *both* sexes, without any gross evidence of vesical disease to account for the symptom. The urine is, however, more or less charged with uric acid, and the patients are of gouty habit or inherit tendencies to gout or rheumatism. This condition is due to the irritating character of the urine, and as such it has already been discussed in Section A of this group (p. 98). But it often happens that the disturbing influence of the urine

locates an outbreak of gout, and an inflammation of the neck of the bladder results. Pus appears in the urine, the symptoms of cysto-prostatitis of a low grade appear, and we have to cope with a mild but often rebellious disease of constitutional origin. This gouty inflammation may commence as an urethritis pure and simple, or it may follow upon an urethritis contracted in the ordinary way, for gout is notoriously cowardly, and invariably attacks a weakened structure. From the anterior urethra it often rapidly spreads to the posterior section of the canal, and implicates the prostate. It is enough for me merely to mention this method of attack, and unnecessary to enter upon the question of whether gout commences in the posterior or the anterior section of the urethra most often; our subject only permits us to consider the gouty invasion of the vesico-prostatic tract, for from thence emanates the irritability of the bladder. As a rule, a middle-aged patient of an hereditary or acquired gouty tendency will notice a slight urethral discharge, which appears without any suspicious sexual intercourse, and almost immediately the symptoms of gouty inflammation of the neck of the bladder will ensue. The patient will suffer from great and urgent frequency, much scalding on micturition, and more or less severe perinæal and penile pain. The prostate, on examination *per rectum*, will prove to be tender and slightly swollen.*

On inquiry it will be generally ascertained that the patient has had no manifestations of gout elsewhere, and the subsequent history of the case in some instances will demonstrate the fact that the gout has selected the neck of the bladder in the place of the orthodox great toe for the site of its periodical outbursts. Mr. Harrison says the attack usually comes on at night, and during the day the symptoms abate, to recur again towards the hours of sleep. As the acute attack subsides it may merge into a chronic state, in which there is frequency of micturition, perinæal uneasiness, thready urine, but not necessarily any obstruction to the stream.†

Treatment.—These cases rarely do well with balsamic remedies, or, in fact, with any of the many methods of cure for urethro-prostatitis. Three or four leeches round the anus, a few doses of alkali and colchicum will make a marked difference in the amount of the irritability.

* I may remind you that occasionally epididymitis is the first and perhaps the sole expression of a subacute attack of gout of the prostatic mucous membrane.

† Harrison, *ibid.*, p. 278.

The alkali, to which the colchicum is added, is varied according to the condition of the digestive organs.

Bicarbonate of potash, soda, or magnesia is to be usually preferred when there is much acidity in the stomach or intestines, whilst citrate of potash or magnesia is more useful where the urine is unusually scanty and high-coloured.

The patient should remain in bed, and in all cases the bowels should be kept open. If the tongue is very foul, a moderate dose of calomel or blue pill, followed by a saline aperient, is required; but if such is not the case it will be sufficient to order a dose of Carlsbad or Friedrichshall water, or tartrate of soda every morning.*

If the disease becomes chronic, iodide of potassium may be added to the medicine you employ. For this and other forms of chronic or subacute prostatitis I have found the granular effervescing sodium citro-tartrate mixed with sodium iodide (3j ter die) a valuable remedy.†

Membrano-prostatic Catarrh.

The shreds which appear in the first part‡ of the flow of urine arise from three or more sources. The long slender floating "pennons" are usually casts of the urethra behind some slight contraction rolled up by the force of the out-rushing stream; the broader irregular flakes, "banners," are sweepings from the surface of granular patches; and the short, thick, rapidly sinking, dull white threads like twisted choppings of white string, "cotton choppings," are casts of glandular tubes, usually of the deep urethra and prostate. I cannot say that much reliance can be placed upon the *form* of these various shreds for localising the site of their origin, but, roughly speaking, the "floaters" come from the penile urethra,

* Dr. S. Fenwick, 'Outlines of Medical Treatment,' p. 494.

† It is prepared by Bell and Co., 225, Oxford Street.

‡ Your patient must always pass water into two separate glasses. I may remind you of what Sir H. Thompson so pertinently says upon the subject of examining the urine. "Make a point of demanding that the patient should pass two or three tablespoonfuls of urine through the urethra, so as to sweep out whatever may happen to be there, after which you will get a pure specimen of the renal secretion *plus* only what deposit may be produced in the bladder. Suppose the patient has gleet or chronic prostatitis, there will be a quantity of muco-purulent matter in the urethra. If this be carried into one vessel with the urine, how will you determine what has come from the urethra, and what from the prostate, and what from the kidney? If I felt disposed I could tell you stories of the gravest blunders committed by not attending to this simple point. I have more than once known a patient treated for pyelitis whose only complaint was a profuse discharge from the urethra" ('Diseases of the Urinary Organs,' p. 12, 8th edition).

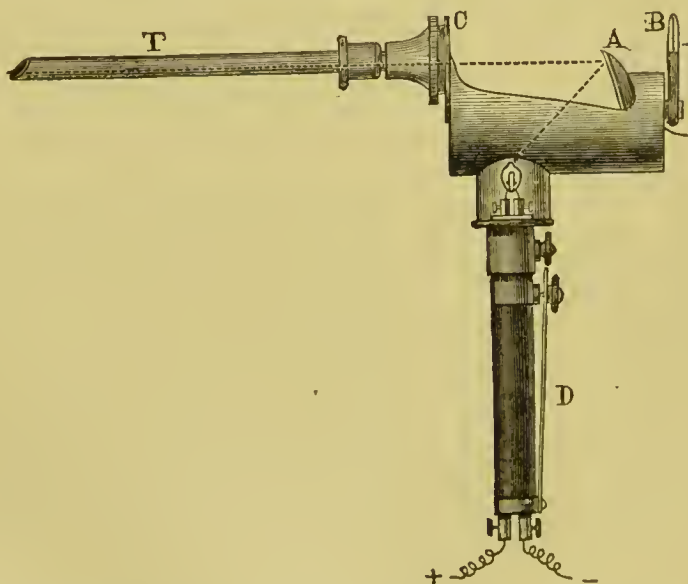
and the rapid “sinkers” of thicker build from the prostate or the posterior urethra.

If in conjunction with prostatic threads an irritability of the bladder is complained of, we are justified in assuming that the case is probably one of catarrh of the bladder neck or prostate. This condition is usually the result of gonorrhœa, blennorrhœa, or excessive masturbation.

With the electric urethroscope of course the nature of the case can be easily determined, and as there is not the same difficulty encountered in learning and using the urethroscope as the cystoscope I recommend the former to you for general practice. I am the more inclined to do this because the lantern which is used for the urethra will serve to illuminate the ear, nose, throat, vagina, and rectum, as well as the urethra.* The instrument, which is called the panelectroscope, is made by Leiter, of Vienna.

* The incandescent-lamp urethroscope is made up of three pieces, D, B C, and T (Fig. 10). These pieces may be described as follows:—1. The handle D is made of vulcanite, and carries on its upper end a small incandescent lamp, connected with the two binding screws which project from its lower end. A light steel spring forms the key. The handle fits into the bottom of the lantern B C. 2. The lantern B C is a roofless gutter-shaped box, carrying at

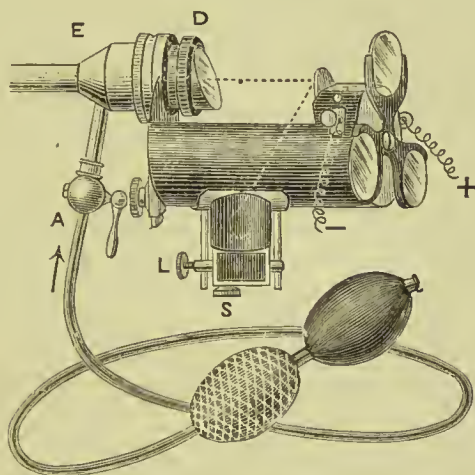
FIG. 10.



one end a fixed, obliquely placed concave mirror A for reflecting light along the urethral cannula T, and at the other the nozzle C for fitting on the urethral tubes. Two additional and important items of the lantern consist in perforations around the lamp for ventilating off the heat, and a small moveable lens B for myopic or hypermetropic observers. 3. A series of urethral tubes T.

My own modification (Fig. 11), which I use for the urethra, differs from it merely in being fitted with an apparatus for inflating the penile urethra (Antal), and various accessories for operating and for enlarging the size of the urethroscopic picture.

FIG. 11.



Author's Aero-urethroscope.

By means of a deep prostatic cannula, which is furnished with a large open window on the under surface of the bend, the prostatic floor can not only be thoroughly examined, but treated topically under direct control of the electric light.

On examining the prostatic canal with the electric light, the mucous membrane will be found changed in proportion to the duration and severity of the inflammation. The surface is usually spongy, granular, and of a dull dark red;* its epithelium is shed, it bleeds easily; tiny scraps of necrotic white fleck the surface, and give it a patchy appearance. The colour of the verumontanum, which I take as a guide to the grade of the inflammation of the canal, is most varied. It ranges from a pink to deep maroon. The size of this body is also an aid, for its hypertrophy points to corresponding change around. The above-mentioned deviations from the normal may remain strictly confined to the surface of the canal, and on rectal examination the gland will most likely be found unaltered. We

* The pressure of the convexity of the tube whilst passing through the membranous urethra causes the surface of that section of the tube to appear pale, whilst the bulging of the succulent mucous membrane of the prostatic urethra into the window of the tube increases the natural vascularity of the part. I consider the prostatic urethra to be the most difficult part of urethroscopy.

may call the above condition membrano-prostatic catarrh; but in many instances the inflammation creeps into the ducts and the body of the gland, and the natural outline of the organ as felt *per rectum* is changed (Catarrhal Prostatitis, p. 162).

Symptoms of Membrano-prostatic Catarrh.

If a patient complains of frequent desire to pass water *in the day*, and the irritability is aggravated by dietetic indiscretion, such as tea or alcohol, or by sudden changes of the weather; if slight aching in the perinæum is experienced, and some uneasiness is felt at the end of the penis after micturition; if the first part of the urine is murky, and contains short, thick, rapidly sinking threads, and some albumen is found in the secretion in excess* of that due to pus; if, superadded to this, the prostate is found tender *per rectum*, and perhaps swollen and tender or resistant to bougies *per urethram*,—then we have to deal with a chronic membrano-prostatic catarrh with slight parenchymatous change of the prostate itself.

Treatment of Membrano-prostatic Catarrh.

There is often much loss of sound mental balance in these troubles. It is surprising how greatly affected the minds of some men are by only a slight surface change of so limited an area. Reflex neuroses of the general nervous system† appear, and are most difficult to treat. It is important then to insist upon outdoor exercise. In this, the non-parenchymatous form of prostatic inflammation, there is no need to interdict any form of moderate exercise, with the exception of riding, cycling, or rowing. Much reliance cannot be placed upon drugs, if we except the iodides and sarsaparilla. Topical astringent applications to the prostatic canal is the basis of successful treatment, and these must be very carefully carried out.

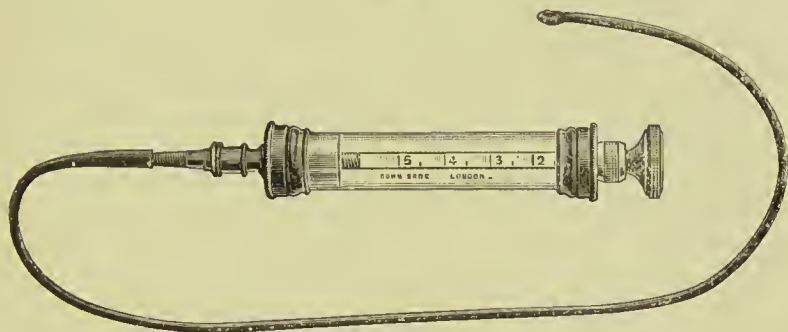
* I may remind you that there is an albuminuria which occurs in inflammatory diseases of the neck of the bladder, and that this bladder albuminuria is in direct proportion to the tenesmus and straining. The subject is a difficult one to discuss here, but it is noteworthy that in many cases the very drug you are taught not to administer in renal albuminuria (opium) cures bladder albuminuria by relieving spasm and straining. Until I learnt this from Ultzmann ('Pyuria,' p. 13, 1883) I was often unnecessarily anxious in my operative interference and more guarded in my prognosis than perhaps I need have been.

† The neck of the bladder is richer in nerves and ganglia than any other part of the urinary tract, and has multiform connections with the spinal and sympathetic nerve meshes. (Compare Section VII.)

Topical Applications to the Deep Urethra.

In chronic catarrh of the membrano-prostatic urethra the medicament used is deposited either as a solid* or as a fluid directly upon the affected part. Of the two I prefer the latter in slight cases, for the fluid is easier to apply and causes less pain. I invariably use Guyon's prostatic syringe and catheter (Fig. 12). You notice the little *boule* at the end

FIG. 12.



of the latter. This small bulb renders all rectal examination unnecessary, for you are able to place the end of the catheter upon the prostatic surface with certainty, and without any difficulty. Thus: pass the catheter down the canal until you encounter, at about five and a half to six inches, a slight obstruction; you are at the opening of the membranous urethra, and the obstacle is the mouth tightly screwed up by the compressor urethræ. It is usually spasmodically contracted in these cases under the excitation of granular patches and ulceration of the surface. This condition is an example of Hilton's law. The same nerve which supplies the mucous

* The many methods of placing solid nitrate of silver on the neck are all, in my opinion, hazardous. Nothing so caustic should be applied to so sensitive a surface unless under the direct control of electric light. Not long ago I was called in to see a young gentleman who had been under treatment for this disorder. His medical man had been in the habit of passing into the prostatic urethra a kind of open cage, in the centre of which a small piece of solid nitrate of silver had been placed. Apparently the screw which affixed the cage to the bougie-like handle became loose, and the terminal was left in the prostatic urethra. The swelling consequent upon the caustic had rendered its removal difficult, the bars of the cage had become bent by being gripped by urethral forceps, and the elbows thus formed had quite impacted the apparatus in the prostatic urethra. When the patient came under my notice his condition was not enviable. The cage obstructed his urethra, while its presence evoked strangury. Under an anæsthetic I was able to release the buried points of the bent wire, and to slide the entire cage into the bladder, where I caught the point with a lithotrite and withdrew it. He recovered, and I lost sight of the case.

membrane supplies also the muscular apparatus surrounding it,* and irritation of the mucous surface causes contraction of the muscular tissues. Press the catheter gently on, and the bulb slips through the pursed-up mouth and enters the membranous urethra. Now fill your syringe with the solution you intend using, and inject it slowly into the membranoprostatic urethra. Some of the solution often enters the bladder, for the internal sphincter is weak, and does not oppose any obstacle to the flow. If you do not need the solution to bathe the neck of the bladder you should use only a small amount, five to ten drops. Various solutions are advised, but you will find nothing equal to nitrate of silver. Two or three points as to the technique of this simple procedure should be mentioned.

1. Three or four minutes after the injection touches the surface the patient will experience a violent desire to micturate. As you do not want your solution washed off for several minutes you make him empty his bladder before you commence operations.

2. You can lessen the subsequent vesical irritation and the immediate pain by giving a hot-water bidet-bath, or by previously injecting a few drops of cocaïne solution, but mark this: if you mix solutions of cocaïne hydrochlorate and argentic nitrate, a thick white precipitate of argentic chloride is thrown down. After injecting the cocaïne wait three minutes, and then wash your tube by flushing it through whilst *in situ* by means of a syringe full of distilled water. Now fill your syringe with the nitrate of silver solution (gr. v, x, xv—xx, to 3j) and throw 5 or 10 minims into the prostatic urethra, and withdraw the catheter. By this means you not only avoid clogging the fine channel of your catheter with argentic chloride, but you cause an impermeable and adherent film of argentic chloride and albuminate to form and remain upon the urethral mucous membrane.

With the weaker solutions we may cauterise every second or third day, and the patient can go without danger to his employment, but in using strong solutions (10 per cent.) a slight hæmorrhago is sure to follow, and in some instances even a transient constitutional disturbance is observed, and on this account I prefer my patients to return home and lie down for the rest of the day if I have used a solution of a greater strength than 10 per cent. The bladder irritability and the slight discharge which the injection evokes, soon subside.

* Hilton, 'Lectures on Rest and Pain,' p. 248.

3. I never employ steel instruments to *dilate* the prostatic urethra in this complaint; I believe it merely aggravates the disease. In severer cases I work with the prostatic cannula under the electric light, and advise you to do the same. The patient empties his bladder completely, and I then invariably inject ten drops of a 20 per cent. solution of cocaine into the deep urethra before inserting the instrument. The patient lies with his hips raised, and the cannula is passed until I judge the window to be at the bladder mouth; the stylet is now withdrawn, and if a little urine follows it is mopped up with a swab and the lantern is affixed. If there is bleeding, Mr. Berkeley Hill's suggestion of dabbing some hazeline over the surface is good, and should be followed. All the granular patches are now touched either with nitrate of silver solution (10 to 20 per cent.), or iodine by means of very small swabs. I sometimes, though rarely, need the solid silver nitrate. Many patients require this treatment repeated half a dozen times before they are cured.

Ultzmann* recommends irrigation of the neck of the bladder, and I have found it of some use when the inflammation affects not only the prostatic urethra, but also the base of the bladder. I recommend a terminal-eyed Jacque's catheter and an 8 oz. antiseptic syringe (Arnold's), p. 74. The point of the catheter is permitted just to enter the mouth of the membranous urethra, and one syringeful of the selected solution is injected through the prostatic urethra into the bladder. The patient is then directed to empty his bladder naturally, and the injection is repeated if necessary. This method, however, can only be adopted if the bladder is able to evacuate its contents completely; otherwise part of the solution will be left in the bladder, and may irritate the mucous membrane.

The solutions I generally employ are either a weak solution of permanganate of potash (m xxiv to eight ounces of distilled water),† or hazeline, a drachm to the ounce, or

* Ultzmann, 'Pyuria.'

† Ultzmann recommends the following, *ibid.* (p. 50):

℞	Acid. Carbolic.	.	.	.	.	.	1·00
	Aquæ Destill.	.	.	.	.	.	500·00
	Ft. sol.						
℞	Alum. crudi, Zinc. Sulph., Acid. Carbolic., āā	.	.	.	.	.	0·50—1·00
	Aquæ Destill.	.	.	.	.	.	500·00
	Ft. sol.						
℞	Argent. Nitratis	.	.	.	.	.	0·20—1·00
	Aquæ Destill.	.	.	.	.	.	500·00

It is best to warm these solutions before injecting. I have no experience of the two former.

iodoform, gr. v to the ounce, or nitrate of silver, gr. j to the 8 ounces.

*The Frequency of Micturition induced or aggravated by Masturbation.**

It is, I believe, comparatively uncommon for masturbation in the healthy to cause a subacute or mild catarrh of the prostatic urethra.† It is common for a gleet to invade and be grafted upon a prostate engorged and weakened by self-abuse, and it is this mixed complication, I submit, which most often induces that extremely obstinate irritability of bladder which is sometimes encountered about the age of twenty-one. I am prepared to admit that often in those addicted to this unhealthy habit, a phosphatic condition of urine exists, and this in itself is sufficient to produce a transient irritability. I will admit, also, I have met with examples of catarrh of the prostate due solely to masturbation, but I am sure they are rarer than books upon this subject would lead you to expect.

CASE 47.—A gentleman, æt. 35, called upon me complaining of a painless frequency of micturition. His history was as follows:—He never had had coition. As a boy he was troubled with incontinence at night, but grew out of it. Years ago he began to be troubled with frequent calls to empty the bladder by day, not at night. This varied greatly with the weather, being worse in cold seasons. The irritability was most marked on rising in the morning—he was forced to pass water three or four times between half-past five and breakfast. On examining the urine I found prostatic threads, pus,

* Perhaps the greatest obstacle to the progress of an honest and scientific study of this unsavoury subject has been the weird and fantastic chimeras of Lallemaud and his school. A natural professional revulsion has caused the wholesale denial of even the thin substratum of fact upon which the unsubstantial but imposing edifice was built by the above-named brilliant writer.

† I may remind you that even slight traumatism of a prostate weakened by excessive masturbation is able to produce inflammatory reaction which may be most difficult to cure.

CASE 46.—A young gentleman, æt. 21, consulted me for an urethral discharge which he had had for eighteen months. I accept his history as perfectly veracious, for it tallies in detail with others I have met with. Excessive masturbation had been practised at school between the ages of thirteen and sixteen, and then the habit was abandoned. Frequent nocturnal emissions replaced the previous loss. One night, eighteen months ago, he was awakened by a feeling that an emission was imminent, and he promptly grasped the penis firmly to prevent it. The obstacle to the escape of the fluid caused him intense pain in the glans and some discomfort in the anus. A slight urethral discharge followed, which disappeared spontaneously after some months, and recurred. A few months before consulting me he had had excessive sexual intercourse, and the urethritis gradually increased, and to it was superadded seminal vesiculitis. He had been treated as a case of ordinary gleet; no one would believe the initial symptoms were not due to impure connection.

and phosphates. As there was no urethral discharge, and the prostate was small cupped and fibrous, I inquired as to masturbation, and learnt that the habit had been indulged in since the age of thirteen. Acids, *nux vomica*, and serpentary cleared the urine of phosphates, one capsule of sandal at night removed the pus, and with a few applications of nitrate of silver (gr. v increased to gr. x to the ounce) to the prostate the irritability disappeared.

For contrast purposes I mention the following extremely obstinate case of prostatic-membranous catarrh, grafted on a surface weakened (?) by masturbation.

CASE 48.—An Austrian gentleman, æt. 36, consulted me in reference to a gleet from which he had suffered for eighteen years. He also complained of great irritability of the bladder, frequent nocturnal emissions, and absolute loss of sexual power: probably there had been previous masturbation. His history was as follows:—Eighteen years ago he had coition. He noticed no discharge from the urethra as a consequence, but fourteen days after he was suddenly seized with a tremendous pain in the perinæum, and the bladder shot its contents out then and there. Immediately a great irritability of the bladder set in, with pain and smarting deep in the perinæum. I think we may regard this description which he gave me as illustrating a mild urethritis which had gained unnoticed the membranoprosthetic urethra. There, it suddenly evoked, as is usual in these latent cases, an acute prostatitis.

But to continue. Since the date of this sudden onset he has been more or less worried by a crawling, creeping sensation in the perinæum; it was slight and not constant; it was worse at one time than another. Alcohol, or a tonic in the shape of iron or acid mixtures, aggravated it to a pitch which was almost unendurable. He never had difficulty in micturition, but attacks of frequency used to seize him every fortnight or a month. He was compelled to urinate three or four times an hour in the day, and rise six times at night. These attacks used to subside, and when he was "well" he could hold his water for five or six hours in the day, and only be called once or twice at night. He suffered no pain on passing water, but was liable to "spasms of the urethra." If he should have had a nocturnal emission the canal closed, and he has been forced to wait an hour before he could urinate. The stream has always been fair unless he gets over-heated, and then it narrows. Since the attack, eighteen years ago, he has never been able to have sexual intercourse, although he gets strong erections at night (? psychical impotence). He has no pain with nocturnal emissions.

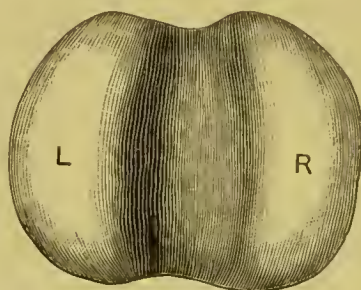
On examination of the urine I found large numbers of spermatozoa in the last few drops, both dead and feebly moving. Urine was otherwise healthy except for prostatic "threads."

On passing the prostatic cannula I found a granular erosion in membranous urethra, to which I applied a dab wetted with 20 gr. solution of nitrate of silver. The prostatic urethra was intensely granular, and the verumontanum swollen. I smeared the surface with solid silverstick under control of the light. The patient passed a little blood subsequently, but found he was able to hold water seven hours in the day and nine hours at night. I repeated the application several times, and he returned to Austria, greatly relieved of all his symptoms, and without gleet; I suggested that his medical man in Vienna should continue the treatment.

You might ask the question, What changes are produced in the surface and parenchyma of the prostate which render

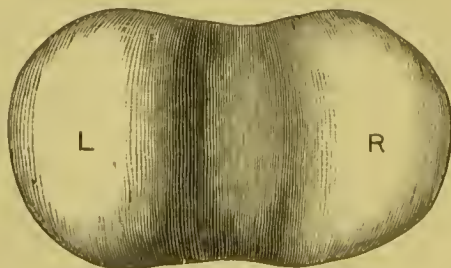
the gland not only susceptible to the invasion of inflammation, but also less amenable to treatment when it is attacked? I cannot answer this question except in the following way:—I have made a series of some hundreds of sketches of the lobes of the prostate gland as they are felt *per rectum* by the exploring index finger. If you will examine a healthy male at the age of twenty-one you will notice the lateral lobes are plump, elastic, equal in size; that they are separated by a *fine* median line or trough, which marks the course of the ejaculatory ducts, and that each lobe corresponds relatively in size to that of its testicle. If now you examine the prostate of a man who has masturbated freely, and in whom the testes are soft and small, you will find the lobes adjoining this median

FIG. 13.



line are soft and shrunk, so that instead of a median convexity your finger encounters a *median concavity* (Fig. 13). The prostate is cupped in this fashion often to a very marked degree. Should inflammation have attacked a gland pre-

FIG. 14.



viously weakened by self-abuse, the lateral lobes will be found broadened, the central depression shallow and more saddle-

or boat-shaped (Fig. 14), whilst the gland itself will feel hard, tough, and resistant. When I find this "cupping" or "saddling" of the prostate *per rectum* I do not trouble to inquire into early habits, but treat the case accordingly, being always less hopeful and more guarded in my prognosis as regards rapidity of cure and full re-establishment of sexual power. This cupping or saddling of the prostate does not point solely to the habit of masturbation, though I generally call a gland thus deformed an "onanitic prostate." It may be due to excessive sexual intercourse, or it may merely afford the index to past inflammation in the neighbourhood of the prostatic sinus and along the track of the ducts, still it is more generally found in those who have freely abused their sexual capacity.

The treatment.—As masturbation is a cause, or merely an aggravator of catarrh of the membrano-prostatic urethra, the treatment of the vesical irritability it induces is the same as that mentioned under the heading of catarrhal prostatitis, pp. 146, 164; but it is noteworthy that the vesical irritability is perhaps better controlled by bromides than is the frequency of micturition due to gonorrhœal membrano-prostatic catarrh.

SECTION VI.

VESICAL IRRITABILITY DUE TO OBSTRUCTIVE DISEASE	. 154

WE have now to consider the causes of irritability of the bladder in those diseases which produce obstruction to the stream of urine.

2. With obstruction to the stream	Diurnal	{ Stone, stricture (6 F. gauge), prostatitis, atony (low degree), rare bladder stammerers, vascular growths of urethra in the female.
	Nocturnal	{ Enlarged and congested prostate without much residual.
	Diurnal and nocturnal	{ Enlarged prostate with residual. Cancer of prostate.

2. *With Obstruction to the Stream.*—All obstructive urinary diseases induce frequency by causing more or less atony, in addition to irritative changes at the bladder neck. It should be a golden rule with you to examine the rectum before you attempt to eliminate stone in the bladder and stricture of the urethra. You will thus often obtain evidence of prostatic obstruction, either of the acute or chronic inflammatory type (in the young adult), or due to a tubercular deposit (adult), or due to cancer of the prostate or bladder base (æt. 45—50), or due to senile enlargement of the prostate (æt. about 50). The reason why you should examine the condition of the prostate first is obvious. A large number of cases of obstructive irritability are of prostatic origin, and in these, for the most part, rigid instruments such as a steel sound often do harm unless especial care is taken to prevent chills after the examination. You will also remember that stone and stricture cause frequency during the day; tubercle and senile prostatic enlargement by night. Afternoon or night irritability of the bladder, with very slight obstruction to the stream occurring at the age of forty-eight or thereabouts, is often the herald of enlargement of the prostate into the bladder, either in the form of outgrowth from the median or

from one or both lobes. But let us consider these causes separately.

Stone in the Bladder.

The frequency of micturition due to stone in the bladder is in proportion to the grade of the cystitis co-existing and consequent upon the foreign body, for if the patient is made to rest, and the vesical inflammation is subdued by appropriate treatment, the irritability in a large proportion of cases diminishes and almost disappears. The minority, under rest and treatment, still suffer. It will usually be found that these latter are cases in which the symptoms have been of long duration, in which the cystitis has become chronic and the muscle-wall infiltrated and atonic, and in which the residual urine is very irritating and offensive. The treatment has been alluded to under the heads of Stone (p. 82) and Cystitis (p. 122), but I may mention that Mr. Hilton was in the habit of prescribing for these cases a mixture of chlorate of potash and hydrochloric acid with advantage.

R Potass. Chlorat., ʒiss.
 Acid. Hydrochlor. dil., ʒj.
 Tr. Hyoscyami, ʒiij.
 Inf. Pareiræ, ad ʒviij.
 M. Ft. mist. ʒj 4tis horis.

Vesical Irritability of Stricture of the Urethra.

The frequency of micturition which is observed in certain cases of tight stricture is not the prominent symptom, for patients with this disease do not complain so much of the irritability as of the distressing obstruction. Nor is it a very usual accompaniment of stricture unless the disease has been neglected, aggravated, or badly treated.

Causation.—The frequency of micturition in stricture depends upon one or both of the following causes :

(a) If subacute inflammation of the deep urethra or neck of bladder is present irritability is complained of, no matter what the calibre of the constriction may be.

(b) If partial paresis (transient atony) of the muscles of the bladder has been induced, irritability—that is, repeated attempts to get rid of the vesical contents—will be present.

(a) *Frequency of Micturition due to Post-strictural Catarrh.*

Statistically the co-existence of deep urethral inflammation or cystitis in *advanced* strictures is not so often encountered as you would suppose. It is about 36 per cent. The reason for this is, there is often a long interval between the date of the discharge which produces the stricture and the onset of the subacute catarrh which the stricture evokes, and in general practice the majority of the cases met with are in the middle stage.

(b) *The Frequency of Micturition in the Atony of Stricture.*

Among the upper and middle classes it is rare to meet with patients suffering from irritability of the bladder due to stricture, for they are sufficiently wise and well off to consult a medical man directly the obstruction to the stream of urine is felt, and this is the first indication uncomfortable enough to attract attention and demand relief. In the lower middle and lower classes it is, however, otherwise. Narrow strictures are the rule. Even here the vesical muscle works so well that in about 44 per cent.* of tight stricture there is no frequency. As the disease progresses and the amount of residual urine increases, the bladder neck becomes dilated, and incontinence, first at night and then during the day, ensues (*vide* Incontinence).

The Characters of the Frequency of Micturition due to Stricture.

It is first noted that the calls for urination are more frequent in the day; the rest at night is unbroken unless the kidneys have been stimulated by alcohol. Like the irritability due to other vesical atonies and subacute inflammations, strictural frequency is largely dependent on the changes of

* My statistics of stricture irritability are not practical, and their accuracy is very doubtful, for so many sources of error creep in among them. I place them before you, however, as they are interesting as pointing to the fact that nearly half the cases of tight stricture have no frequency. All these cases are taken without reference to age of the patient or duration of the disease, and without regard to the number or situation of the stricture. The canals only admitted a fine bougie—none had retention.

Call every $\frac{1}{2}$ -hour.	Call every $\frac{1}{2}$ —1 hour.	Call every 1—2 hours.	Call every 2—3 hours.	Normal call.
—	—	—	—	—
14 per cent.	10 per cent.	16 per cent.	16 per cent.	44 per cent.

weather, on posture, diet, and age of the patient. It is liable to come on in bouts or attacks.

Two examples will suffice :

CASE 49.—This young fellow, aged 24, who has had symptoms of stricture for twelve months, complains that although he can hold his water for half a day, yet if he takes any beer he is troubled with calls every hour in the day and three or four times at night. You notice this fine *bougie à boule* stops abruptly at a stricture situated at five and a half to six inches from the meatus. On dilatation of this stricture his symptoms will probably cease ; he has hardly any residual, but the little he has is periodically charged with irritating products the result of beer drinking.

CASE 50.—This second patient is suffering from a very great irritability. He is passing urine every fifteen minutes in the day, and twice at night. He is unable to make a stream at all, the urine merely dribbles out. In his efforts to get rid of his water the bowels act. He has no real pain. You notice the stricture from which he is suffering admits, with a little manipulation, this fine bougie. This is withdrawn, and another of No. 10 French gauge is passed. This in its turn is withdrawn and a catheter is introduced, and 30 ounces of clear urine of low specific gravity are withdrawn.* I do not mind him leaving the hospital at once, for he is young, his symptoms have not lasted long, and he has never had any ague or malaria (*vide* treatment), but for absolute safety I prefer him sent back to his ward with a hot bottle in his bed, and a dose of quinine.† I can safely predict that in a week's time his residual urine will be about an ounce ; that is to say, his bladder will have recovered its contractility so far that it will expel all the urine with the exception of an ounce.

If a record chart of the amounts withdrawn at each weekly sitting from the commencement to the completion of the dilatation of such a stricture be constructed, certain interesting features may be observed.

The following is the chart of a man aged 42, who had suffered from stricture for five years. The obstruction was situated at 3 inches ; it admitted a No. 4 French bougie, and at

* No further treatment was adopted for a week. Residual urine then measured half an ounce, and he had no frequency ; gradual dilatation was then proceeded with.

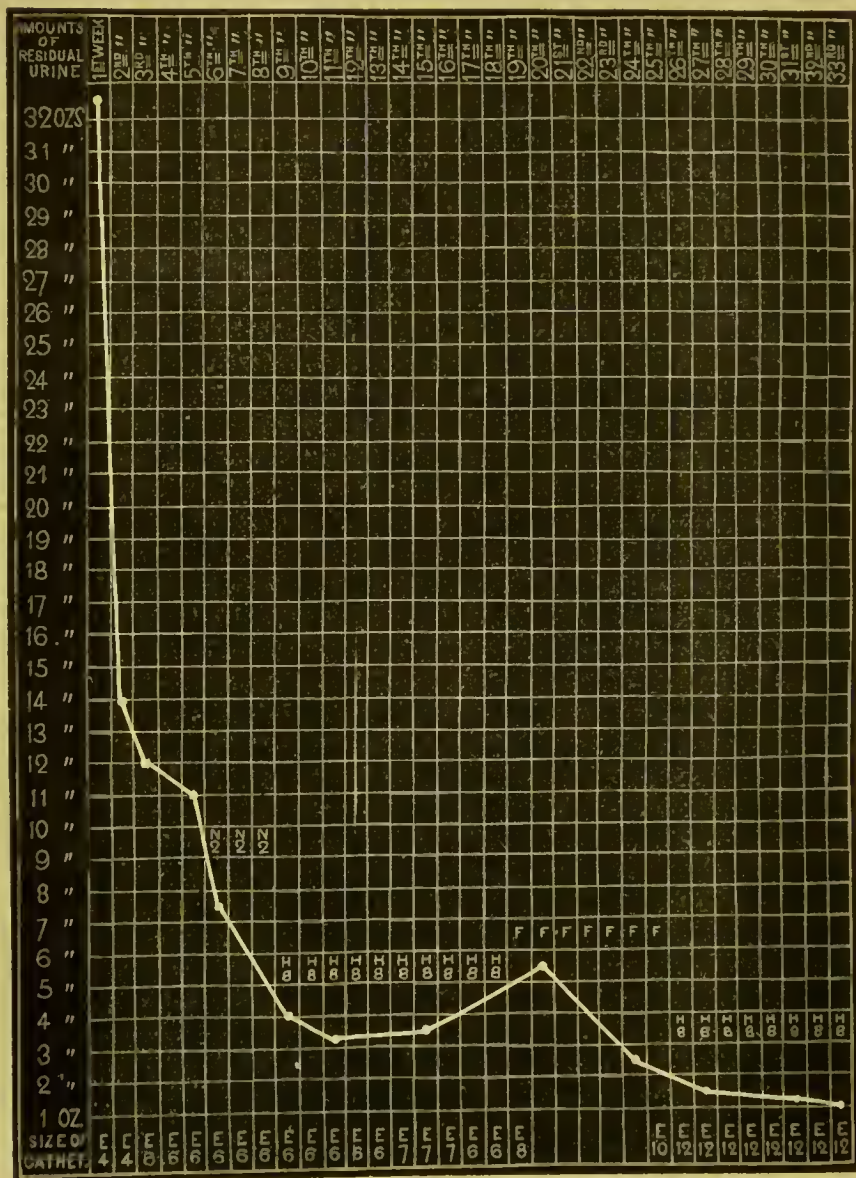
† ℞ Tr. Digitalis, ℥x.

Quinine, gr. v.

Brandy, ʒj. Ft. hst., *shake*. Statim sumend.

the first sitting 32½ oz. of residual urine were withdrawn. At the second dilatation a week after, a No. 4 English bougie was passed, and the residual urine was found to be 14 ounces. At

FIG. 15.



the third week it was 12 ounces, and so on. You notice the number of the bougie passed is at the bottom of each column; the week stands at the top.

The sudden fall from $32\frac{1}{2}$ ounces to 14 ounces denotes a prompt but partial reaccession of power, the subsequent gradual descent indicates a tardy but ultimate recovery.

The gradual descent of the curve is noteworthy; it is broken in this instance by a secondary ascent, the reason for which will be subsequently discussed when dealing with the subject of relapse.

The most remarkable feature of the chart is, however, the line representing the sudden drop in the amount of residual urine from $32\frac{1}{2}$ ounces to 14 ounces in one week.*

It signifies that this individual bladder had in one week regained the power of expelling 18 fluid ounces. A sudden drop is a characteristic of such charts, for it is found in all cases of sudden release of tight stricture.† The amount of the drop indicates the *temporary* loss of power which the bladder had sustained. The amount noticed is often extraordinary.‡

As might be expected, the promptness and extent of this rapid recovery varies greatly in different bladders. So many vital and mechanical factors have to be considered, that it would be premature at present with our limited statistics to attempt to formulate it. The rough and ready rules I invariably teach are these:—(1) A smart initial recovery of the vesical muscle is to be expected in every case where a narrow stricture has been suddenly enlarged. (2) The older the vesical muscle is, so much the less marked will be this recovery. (3) A smart initial recovery is no criterion to the

* This drop proves how valueless the estimation of the degree of vesical atony is when measured by the amount of residual urine found at the first sitting.

† The following cases will serve as illustration:

CASE 51.—E—, æt. 32, had suffered from stricture of the urethra for three years. The obstructions were situated at $3\frac{1}{2}$ inches and $5\frac{1}{2}$ inches. A filiform guide was passed with difficulty, and the constrictions dilated to No. 10 French calibre. The residual urine was withdrawn after micturition; it amounted to 13 oz., acid, clear. Sp. gr. 1005, no albumen. Next week only $3\frac{1}{2}$ drachms were withdrawn, and the week after that only two drachms were found.

CASE 52.—C—, æt. 33. Stricture of five years' standing, situated at $6\frac{1}{2}$ inches to 7 inches. A great difficulty with the guide. The constriction was dilated at once to No. 10 French; 12 oz. of residual urine were evacuated. Sp. gr. 1002. The next week only $\frac{1}{2}$ oz. was found.

CASE 53.—J—, æt. 32. Stricture for seven years. Residual urine 9 oz. at first sitting, and only $1\frac{1}{2}$ drachms the next week.

CASE 54.—H—, æt. 42. Stricture for eight years at $5\frac{1}{2}$ inches; $14\frac{1}{2}$ oz. were removed the first week as residual urine, and $6\frac{1}{2}$ oz. the next week.

CASE 55.—S—, æt. 35. Stricture for five years, situated at 5 inches. Residual urine, estimated at the first sitting, amounted to $6\frac{1}{2}$ oz. At the second (after a week's interval) only 7 drachms were withdrawn.

‡ Author, 'Path. Trans.,' "Diabetes Insipidus," vol. xxxvi, p. 301.

rapidity of the ultimate recovery. (4) The frequency of micturition decreases *pari passu* with the decrease of the residual.

The ultimate recovery.—After this sudden fall it will be seen that the tracing in Fig. 15 takes many weeks in declension; that is to say, the bladder in this case, after its first access of power, regained strength but slowly. Bladders differ widely in the length of time which elapses before they *finally* regain their strength.

Some recover quickly, others recover but indifferently both as regards time and completeness.

Relapses in frequency.—Frequency of micturition due to strictural paresis has a great tendency to reappear, and this usually depends on the recurrence of the obstruction producing a relapse in the vesical atony.

The downward curve of the chart (*vide* Fig. 15) becomes suddenly interrupted; the amount left in the bladder after urination, instead of steadily decreasing, suddenly increases. Very slight causes are sufficient to effect this relapse. A cold, an unavoidable delay in relieving the bladder, a single excess in alcohol or coition. The following may be cited as examples :

Initial.	Age.	Original amount.	Amount reached before relapse.	Relapsed to.
W.	57	10 oz.	{ 1st relapse 5 dr. 2nd relapse 4 dr.	1 oz. 3 dr. 2 oz.
H.	42	14½ oz.	2 oz. 1 dr.	2 oz. 4 dr.
C.	33	12 oz.	4 dr.	1½ oz.
J.	32	9 oz.	1 dr.	1 oz.
C.	28	?	6 dr.	1 oz.
S.	53	6 oz.	1 oz. 2 dr.	3 oz.

The rule may be fairly stated thus:—The larger the amount removed at the first sitting, the older the patient, the greater is the tendency to relapses.

Treatment of the Irritability of Stricture.

If from an examination of the urine it is evident that sub-acute membrano-prostatic catarrh is present, your treatment embraces the correction of this complication (comp. p. 146), but the stricture must first be gradually dilated. I need hardly warn you that any signs of inflammation of the canal

contra-indicate any rapid or forcible dilatation of the stricture. A boro-benzoate mixture (p. 111) is a valuable adjunct.

If the urine is healthy and the patient under forty-five, and no history of tubercle is present, the single passage of a dilating bougie, from guide to No. 10 French gauge, will be sufficient to check the frequency at once, for the amount of residual urine drops immediately. You may, in fact, promise relief in a few hours, and that without drawing off the residual, so rapid is the recovery of the vesical muscle from its temporary overstretching and consequent paresis.

Injudicious Treatment of Stricture.

The majority of cases applying to you for relief of stricture will only need gradual dilatation,* but there are certain accidents which may occur even in this simple operation, against which I must caution you.

It is unwise to pass instruments upon seafaring men, or upon those who have had ague, malaria, or coast fever, unless you can keep them in bed and under the influence of quinine or some antipyretic. These diseases are, I am sure, merely due to septic poisons, and any operation will render the latent poison active. In dilating a stricture of the deep urethra in men who have been thus exposed to, or who have suffered from, these diseases, dangerous renal complications are apt to arise. I have known death rapidly follow a slight dilatation in two instances, one being an out-patient under my own care. I prefer internal urethrotomy without any dilatation of the tight stricture if I obtain a history of malaria or coast fever.

Again, it is unwise to dilate a stricture of the spasmodic type, or one in which urethritis is co-existing, unless you are in touch with the patient, and can hold yourself in readiness to relieve the retention which frequently results.

Catarrhal Prostatitis† (Parenchymatous Prostatitis).

Acute.—The prostate is felt greatly swollen *per rectum*; the

* In America it is the fashion to cut all strictures without reference to their size or position. The class of patients which I am now mentioning will not—mostly cannot—give up the time required for internal urethrotomy, and are quite content with the relief afforded by the weekly or bi-weekly passage of a bougie.

† Gross ('Urinary Surgery,' p. 371) says, "Direct injury, the rude introduction of the catheter, or the protracted retention of that instrument in the bladder; the passage of fragments of calculi; irritating applications made to

patient is usually a young adult ; there is a history of gonorrhœa or cold ; frequency is marked ; the stream is very small.

Chronic.—The prostate is enlarged, often tender ; the stream is small, but varies in size and is difficult to start ; frequency of micturition occurs in bouts.

I have already glanced at the subject of inflammation of the mucous membrane of the prostatic urethra, in which the stream of urine is not affected—membrano-prostatic catarrh (p. 145). We have now to consider those cases in which the inflammation creeps along the ducts into the secreting tissue of the gland, causing considerable enlargement of the organ, and consequent obstruction to the stream of urine passing through it.

Acute Prostatitis.

The onset of acute parenchymatous prostatitis is usually characteristic. The patient, who is not infrequently suffering from gleet at the time, is suddenly seized by a burning pain in the neck of the bladder and a frequent and imperious call to pass water, with a pain in the glans penis after the act. There is a sense of obstruction experienced to the passage of urine from the very commencement. These three symptoms keep pace with one another, and rapidly culminate. The frequency becomes excessive (every five minutes), and the sharp, throbbing, constant perinæal pain is increased by any movement or jerk of the body, or even by the erect position ; it is not confined to the perinæum, but is felt supra-pubically, along the thighs, up the course of the ureters, and in the sacrum. The urine is scanty, voided by teaspoonfuls, causing by its acidity an intense scalding, and in the most acute forms blood follows the last drops emitted. The difficulty in micturition is sometimes succeeded by complete retention. Superadded to these symptoms there are others, denoting great constitutional disturbance and local extension of the inflammation to the rectum.

It is your duty to examine *per rectum*, but it will be a painful proceeding for the patient. Usually you will content yourself by feeling an obstacle in the position of the prostate just within the anus, and in the subacute stages you may even insinuate your finger along the back of this obstruction ; you

the prostatic portion of the urethra ; venereal excesses ; onanism ; frequent and prolonged erections ; constant exercise upon horseback, will occasionally produce the disease, by maintaining habitual engorgement of the gland."

will then recognise that the prostate has enlarged to the size of a large Tangerine orange.*

The course is generally rapid; in three days the frequency usually abates, and seven days will cover the worst of the attack. If wisely treated, it terminates favorably without suppuration; but in a small percentage of cases severe throbbing pain at the anus, sudden rise of temperature, rigors, vomiting, and delirium denote that suppuration has commenced. The outlook is then more serious, and prompt operative interference is necessary. But there are many grades in the severity of this disease.

CASE 56.—This patient, aged 22, who refuses to stop in the hospital although his prostate is the size of a small apple, does not seem much distressed either by pain or frequency. He certainly has constitutional disturbance, and his temperature is 101° , but he is only micturating every hour, and he has none of that constant tenesmus and desire to go to stool which others suffering from the same acute form so frequently complain of.†

Chronic Prostatitis.

It is the chronic form of the disease which proves most troublesome. With some surgeons it is an axiom, "Inflamed prostate once, inflamed prostate ever." I do not agree with this, for I have known many recover completely from the attack. Often, however, the patient continues to be troubled with constant but slight prostatic pain and vesical irritability, and in these the inflammation is liable to recur upon the slightest provocation, cold, venery, excess in alcohol, severe exercise being the usual excitant. More especially is recrudescence marked in those who have lived in the tropics, or those who have been saturated with ague, malaria, syphilis or gout. In such your prognosis as to a permanent recovery must always be guarded.

CASE 57.—This patient, M—, æt. 45, sea engineer, from Mellish Ward, is an excellent example of the relapsing form of chronic prostatitis.

Two years ago he came to me complaining of stoppage of urine, frequency, and pain in his back and down the legs. These symptoms were due to sub-acute prostatitis. His condition now is the same as it was then. He says that he was quite healthy up to the age of thirty-six. At that time he suffered from an urethral discharge, and subsequently had all the symptoms of acute prostatitis. He gradually got better of this and went to sea, but "ever since he has been losing his jobs, for every twelve months he has a

* It is said to vary. A walnut, a hen's egg, a large orange, are the terms often used to denote the size.

† This patient was lost sight of.

recurrence of the pain and the frequency. He attributes his relapses to colds. He has had yellow fever. Five weeks ago he came to me during an attack. He was passing water every half-hour in the day and three times at night.

There was "awful pain" at the back, at the base of the sacrum. This pain passed over the iliac crest into the hips, and on micturating it radiated into the testes, penis, lodged around the corona, and darted down the sciatics into his heels. His back, he said, often felt like a cold plate, and his testes grew quite numb and cold. The stream of urine was variable, but it is indifferent at all times. On examination *per rectum*, I found his prostate enlarged and very tense. His temperature high, his tongue coated. He was sent here and treated with hot rectal enemata. He is now much better in every way. On my last cystoscopy a day or two ago, I found the base of the bladder much swollen, and quilted squarely with chronic inflammation which has implicated the bladder by contiguity; the rest of the bladder is healthy, but the ureters, the right especially, are puckered and pouting.

One of the effects of the impediment which the swollen prostate offers to micturition is the production of atony. The atony (as gauged by the amount of the residual urine which exists in every case of chronic recurrent prostatitis) varies greatly in amount, but it has, I believe, a very powerful influence upon the recrudescence of the disorder and the grade of irritability noticed. If the residual should be or become unhealthy, septic or acrid, it, in itself, may cause the symptoms to reappear. I place before you a very remarkable case of atony of chronic prostatitis.

CASE 58.—This young fellow, who is twenty-one years of age, had an attack of acute prostatitis six or seven years ago, probably due to sudden cold affecting an *onanitic* prostate. He has been under treatment in various hospitals and under several surgeons, and yet the frequency of micturition, which has been diagnosed to be due to the enlargement of the prostate, does not subside. He was under my care for a long time before I found out the cause of the irritability. One day I attempted to examine him with the cystoscope, and on washing out the bladder I noticed that I withdrew a good deal of urine. I did not pay any attention to the fact, however, as I thought the lad had not passed water recently. After the irrigation I introduced 8 oz. of medium and passed the cystoscope. To my surprise I could see nothing, all was a red fog. I therefore injected four more ounces of medium, and found to my surprise that the lateral walls of the bladder had fallen inwards and were inclined to one another. I at once realised I was dealing with a flabby, atonic bladder, and this proved to be the case, for he had a residual of 17 oz. By persistent use of the catheter this atony was reduced to 5½ oz., which I am afraid to say represents the permanent loss of power. The frequency also dropped at once for every two hours in the day and twice at night to six times in the twenty-four hours.

Treatment.—The treatment of the acute form is the same as that of acute cystitis (p. 122). In addition to that previously described, free depletion by means of ten to fifteen

leeches around the anus is often of decided benefit in the gonorrhœal variety. Rectal examination beyond the initial diagnostic exploration is to be condemned unless symptoms of suppuration arise. If pus forms in the prostate it usually presses towards the urethra and induces retention, and the very means you adopt to relieve this symptom will often cure the disease by the point of the catheter you introduce ripping into the softened abscess wall. In those cases where abscess forms around the prostate (periprostatic) the pus may point in various ways. I have laid them open through the perinæum, by the ischio-rectal fossa, through the rectum, and by the prostatic urethra; in fact, wherever the abscess seemed to be pointing. Place your incision where the abscess is pointing. There is no doubt that if you are able to command your line of incision the perinæal is the surgical route, for it can be kept cleaner, and there is less chance of septicity ensuing. No urethral instrument should be passed unless there is retention. In the latter case the soft Jacques catheter should be employed. Cathartics should not be administered.

The treatment of the chronic form is often tedious in the extreme. I have had patients under me for long periods who do not seem to improve beyond a certain point.

I have always followed out the late Mr. Berkeley Hill's directions, and have found them more trustworthy than most methods. General treatment only assists local remedies. In the first place the dyspepsia must be cured. The tonics most beneficial are iron in non-astringent forms; *nux vomica* or strychnine is usefully added to the iron. *Belladonna* also may be added to the tonics if micturition during sleep be a symptom. *Ergotine* is especially useful when the organ is large, and aching is caused by walking, or standing, or railway journeys.

When the organ is enlarged, soft, and not tender, a very good remedy is the cold sitz-bath, taken at first for one or two minutes, once or twice daily, at a temperature of 50° F., gradually prolonged to ten minutes, and lowered to 40°. The cold douche on the perinæum or anus is also useful. Cold enemata are more generally beneficial than baths. Two to four ounces of cold water are thrown into the rectum daily, and retained there, beginning at 45° F., and gradually lowered to 35°. Among recognised remedies is blistering the perinæum, but Mr. Hill has no faith in its efficacy. Caustic instillations are valuable if used after other means. The solution of 20 to 30 grains of nitrate of silver to the ounce, and 10 minims

injected at a time, is a good preparation. This has to be repeated several times. Compare page 147.

Atony.

I must ask you to give especial attention to this subject. From what you have just heard (p. 156) of the frequency in the atony of stricture you might be disposed to accept without further thought, that irritability of the bladder exists in all forms of atony. This would be, I believe, an important error, for atony of the bladder is the result of many causes, and yet irritability is only present in certain forms of vesical paresis.

To give you some idea of how the bladder muscles may become weakened, I have taken six of my note-books, and have synopsed all the cases in which atony* was found.

(a) Nervous structure impaired	{	Spinal {	Recovered fracture of spine	5
			Curvature	1
			Spina bifida occulta	1
		Locomotor ataxia, chronic myelitis, &c.		20
		Stricture	63	
b) Muscular structure impaired	{	Enlarged prostate	42	
		Infiltration of muscle wall {	Tubercle	8
			Carcinoma	4
		Prostatic inflammations		9
		Forced retention of urine		4
		Pin-hole meatus		1
		After fevers (influenza)		2
		Saccule pressing on urethra		1

In glancing through this list of atonies you notice that there are two divisions; (a) that in which the nervous structures supplying the bladder wall have been impaired, and (b) those in which the muscular planes themselves have been weakened.

If we accept the insensitive bladder of the aged, you may say, "When the power of the vesical muscle is mechanically impaired, but still unexhausted, irritability ensues; if the obstruction is unrelieved the atony is progressive, and culminates in retention or incontinence." But the atony of degenerated or

* What is the gauge of atony? If residual urine is evacuated by catheter after the patient has passed all he or she possibly can, the greater or the lesser extent of the paresis may be surmised according to the amount withdrawn at any one time; but this amount is no accurate gauge to the extent of the loss of expulsive power—a mean of many examinations must be taken. Compare footnote, p. 178.

inefficient nerve-power is different. Let us consider the atony of *chronic* diseases of the spinal cord. Does frequency herald the onset of incontinence in this class? Rarely. The onset bladder symptom is usually incontinence at night, less seldom is it frequency, and very seldom indeed is it marked by retention. The different manner in which the bladder is affected depends on which part of the organ is deprived of its nervous influence. Thus destruction of the centre for the detrusors alone, produces paralysis of the detrusors, and retention ensues. When the action of the detrusor centre is only impaired, but not destroyed, the expulsive power is diminished, the patient labours with the abdominal muscles to reinforce the weakened detrusors, and irritability results in the day, and usually incontinence at night.

Destruction of the sphincter centre produces true incontinence, the water leaving the bladder as soon almost as it enters. I cannot go further in this very interesting subject, for I must touch upon it in the frequency of overflow, and deal with it in my lecture on difficult micturition; and I only mention it now for fear you should consider that all forms of atony must produce a frequency of urination.

Urethral Caruncle.

Urethral caruncle of the female urethra.—A small raspberry-red growth is seen occluding the orifice of the urethra, or is found a short distance down the canal by means of the urethroscope. This small vascular growth may be productive of the severest dysuria, or it may cause no symptoms whatever. When it is very troublesome, other irritating conditions are present. Thus it may be aggravated by acrid or heavily charged urine, or by cracks or fissures in the adjoining floor of the urethra, produced by the patient herself in her unconscious attempts to relieve the persistent irritation and pain.

The frequency of irritation is at first diurnal, and is out of all proportion to the trifling nature of the complaint. It is of a reflex character in the earlier stages, and is partly due to reflex excitation, and partly to slight muscular atony of the bladder produced by the obstruction of the growth. When the disease has existed for some time this atony may amount to some ounces, being more especially marked as age advances. The nights finally become disturbed until the nocturnal frequency is almost as troublesome as in the day.

CASE 59.—A lady, æt. 70, was lately sent me by Dr. Hogg, of Ealing, with a diagnosis of urethral caruncle, but with a request to examine the bladder with electric light, as the vesical irritability was extreme. Her history was as follows :—Five years previous to seeing me she was forced to over-hold her urine, and she dates the frequency from this time. She gradually noticed an obstruction to the stream, then an irritability with pricking pain in the canal, and a dull pain across the sacrum. Finally the frequency was every half-hour in the day and twenty times at night. The number of times this lady got out of bed was reckoned by means of buttons. There was apparently much mental distress.

I found the bladder atonic (3 oz.). There was a deep post-trigonal pouch. There was subacute catarrh at the left ureteral orifice. The bladder was washed out, but it afforded no relief, and the caruncle was therefore removed and with it some of the adjoining mucous membrane. The urethra was fully dilated. It is too early yet to speak of permanent effects, but she was relieved. Many of the cases at this age prove very obstinate.

The trouble is readily diagnosed, for when women complain of pain increased by sexual intercourse, irritability of the bladder, and occasional urethral bleeding, the *uncocainised* urethra should be examined at once, and if a small vascular growth be seen it should be touched with a probe. Usually this causes great pain,* and the indications for the removal of the caruncle are complete.

Treatment of urethral caruncle.—I do not advise you to apply chromic acid, nitric acid, or carbolic acid, for I am certain nothing short of complete removal of the growth is of any permanent benefit, the tendency to recurrence being so great. You may do this small operation under cocaine. Pass a wire speculum or a Reeve's speculum, and if the caruncle be sessile, dissect out the growth, taking care to take the subjacent mucous membrane with it; or if the tumour be pedicled, snip it off with scissors, and apply the galvano-cautery to the base. If subacute cystitis and residual urine co-exist, this must be treated on the lines already laid down.

Nocturnal Frequency with Obstruction to the Stream ; Enlarged and Congested Prostate without Residual Urine.

Among the prominent symptoms of the early stage of senile prostatic enlargement we encounter an irritability of the bladder. This frequency of micturition in elderly men may be sudden and excessive, and it then precedes by a few hours an acute and complete retention of urine. In this case both frequency and the dysuria are due to sudden congestion of the prostate, the result of an exposure to cold, venereal

* Venous angioma and vegetations are said to be painless.

excess, or a debauch. This condition and its treatment will be treated with the subject of retention. There is, however, a nocturnal frequency which, in men over fifty years of age, is a prodrome of unquestionable diagnostic value.*

The onset is often insidious. The patient not infrequently misinterprets the repeated night call to urination, and neglects to seek advice. The summons comes usually between three and four o'clock in the morning, and it is repeated several times before breakfast. Often there is a slight difficulty in starting the flow, and the stream of urine has also lost some of its force and volume. These symptoms occurring at this age often permit you to make a diagnosis of commencing enlargement of the prostate.

Diurnal and Nocturnal Frequency with Obstruction to the Stream.

Enlarged prostate.—The first stage, which consists in a slight frequency at night, has a variable duration. It may exist for months or years; some patients, indeed, may hardly cross the boundary line to enter the second period of prostatic life, that of obstruction. Many an old man dies with an unsuspected enlargement of the prostate. Usually, however, the disease, once started, is progressive, and the consequent symptoms depend not so much upon the form of the obstruction as upon the character of the bladder which attempts to overcome the impediment. The vesical changes, and therefore the prominent symptoms, separate into two classes; in one the bladder is dilated, in the other that viscus is contracted.

1. The dilated bladder, (a) without or (b) with hypertrophy. I believe most cases fall into this group.

(a) The annoyance at night of rising once or twice is gradually increased, until the patient finds he has to get up perhaps every hour after four o'clock. His bladder is also more irritable in the day, and there is a sense of weight and fulness in the lower part of the belly. Residual urine is collecting, and the muscular force is wearying itself in its endeavours to expel its increased load. This decrease of power

* I am unable to say with certainty whether this irritability is due to reflex excitation of the kidney (the frequency of quantity), or to the frequency of direct irritability. The subject has not been thoroughly worked out, and my own clinical notes, though taken from a comparatively large number of patients, have been mostly derived from the later stages of the disease.

and increase in the residual urine is evidenced by the length of the latent period,* the thin feeble and vertical stream, by the unsatisfied feeling after micturition, and by the call for micturition which jolting, or even the sudden assumption of the vertical position, will evoke. At this period, either the patient begins to wet the bed at night and consults you on this account, or after an exposure to cold he may get a sudden congestion of the prostate, and retention will ensue.

On passing the catheter to relieve him you are surprised to find what a large amount of clear and limpid urine he has been carrying without complaint or much discomfort. Seventy ounces were removed from this patient from Mellish Ward, upon whom I have lately performed perinæal prostaticotomy,† and I have known of enormous amounts being evacuated. The following case is recorded in the 'Lancet'‡ by Dr. Watson Williams, and it will show you how insidiously these cases progress.

R. S—, æt. 74, came complaining of attacks of giddiness, breathlessness, and general indisposition, and also of dropsy in the feet and legs. His pulse was feeble, hard, and irregular, and the heart's action was decidedly weak. I noticed that the abdomen was greatly enlarged, and, suspecting fluid in the peritoneum, I made him lie down so that I might examine his abdomen. He stated that he had not noticed any marked increase in the size of his abdomen recently; but that while for five years his tailor had told him he measured forty inches round the waist, he had measured forty-two inches for the last twelve months. He certainly had noticed that his clothes were none too loose lately. On percussion the characteristic wave of fluid was transmitted from one side of the abdomen to the other, but the area of dulness occupied the whole of the anterior of the abdomen, while the flanks were resonant, and it extended up to within an inch and a half of the xiphoid cartilage. The patient declared that he had not felt the slightest difficulty in holding or passing his urine; on the contrary, he had noticed for some years past that he could retain his urine for an unusually long time without discomfort; in fact, he stated he could hold it for twelve or twenty-four hours without inconvenience. In the face of such statements it was difficult to believe that it was a case of distended bladder in spite of the physical signs. However, I asked a surgeon to pass a catheter, and a large quantity of clear urine was drawn off. As the bladder had not lost its expulsive power, and there was no evidence of distension by pressure, we thought that it would be safe

* In using this convenient term I may remind you that it is applied in physiology to the interval of time between the stimulus to the muscle and its contraction. I employ it to denote the time which the vesical muscle takes before it contracts in obedience to the call or the will.

† This patient recovered his vesical power, and I saw him some months after passing a good stream of urine. I have just heard that he died with renal symptoms (?).

‡ 'Lancet,' 1892.

to continue to draw off the urine without fear of setting up cystitis. Altogether 205 fluid ounces of perfectly clear urine were withdrawn without completely emptying the bladder, and the patient's bladder retained its expulsive power to the last. He died seven days after.

You see, then, that a bladder may become very largely atonied without evoking striking symptoms; it may even contain free or encysted stone without much additional suffering. It is merely a toneless insensitive reservoir, needing only periodical emptying and occasional cleansing to keep its possessor in comparative comfort. Happy the patient who owns a bladder like this, and who has safely crossed the bridge of catheter life.

(b) With hypertrophy. In the majority of the cases the detrusors hypertrophy, and yet are unable to cope with the prostatic obstruction; residual urine collects, the bladder dilates. Recurrent congestion of the prostate offers recurrent impediment, and the increased effort of the muscles to keep pace with each additional narrowing of the outlet forces the mucous membrane out between the muscular fasciculi, and sacculi are formed. Cystitis of a low grade then commences, and as the little herniated protrusions of mucous membrane cannot empty themselves, their stagnated contents act as so many independent harbours of decomposing filth, which serve to perpetuate the foulness of the general cavity of the bladder, and to lay the foundation for the subsequent formation of free or encysted stone.

The symptoms in this class are more marked and more distressing; the surgeon, therefore, appears earlier upon the scene, and the character of the case is, on the whole, less dangerous than when the insensitive atonied bladder is dealt with in its final stages.

2. *The contracted bladder*.—I know of no form of senile prostatic enlargement more pitiable or more hopeless than when the bladder has contracted from interstitial cystitis. The muscular fasciculi are first shackled in expansion by the interpenetration of a dense fibroid material the result of inflammation, and are then shortened by the shrinkage of this inflammatory material. In this class of case the bladder only holds two or three ounces of urine, and often as not the patient is unable to get rid of this without the catheter. Every hour then the catheter has to be introduced, and the misery and pain of incessant instrumentation is insupportable. Luckily this—the contracted bladder—is a rarer form of prostatic complication than the dilated or semi-dilated.

Causation of the Frequency of Micturition in Enlarged Prostate.

First stage.—It is probable that the frequency which is observed in the very commencement of the growth of the enlarged prostate is due to the excitation of the normal function of the prostatic urethra. The reflex nervous arc for micturition is stimulated either by the tension of the enlarging body upon the capsule of the gland, or by pressure upon the urethra itself. In most cases, judging from cystoscopic examination of the orifice of the urethra, there is the extra stimulation of a simultaneous congestion of the entire neck of the bladder, and this usually without residual urine being present. I cannot accept my colleague Mr. Reginald Harrison's view that the posterior wall of the bladder sinks first, and that residual urine accumulates prior to the enlargement of the prostate, or that the enlargement of that body is muscular and follows upon the hypertrophy of the bladder. Enlargement of the gland, in my opinion, is first, the loss of power of the vesical muscle and the collection of residual urine second, and the cystitis and other inflammatory complications usually third. I have already opposed Mr. Harrison's view upon the result of many post-mortem examinations, but I have had more certain basis for my dissent in the cystoscopy of early prostatic frequency. I have seen slight median enlargements, lateral outgrowths, and complete enlargement of the gland with very little if any residual.*

* Age.	Frequency.	Residual urine.	Character of enlargement.
48 ...	Every 2 hours, Day Every 3 or 4 hours Night	... 1½ drachms ...	Strong and high prostatic bar.
52 ...	Once an hour to 2 hours, D. ... Every 6 hours, N.	1 ounce ...	Large median lobe, left.
60 ...	Every 2½ hours, D. Every hour, N.	... ¾ ounce ...	Upraised collar.
62 ...	Every 2 hours, D. Every 7 or 8 hours, N.	... 5 minims ...	Much enlarged <i>per rectum</i> .
52 ...	Every ½ hour, D. Twice every hour, N.	... ½ ounce ...	Enlargement of entire gland; bladder base quite plane with orifice.
69 ...	Every 5 hours, D. Every hour, N.	... 1 ounce ...	Very large prostate.
61 ...	No especial frequency, ... but uneasiness, weight, and feeling he has not emptied his bladder.	None ...	Large and smooth prostate.

Second stage.—When residual urine collects and decomposes, the irritation of its presence, and the cystitis it induces aggravate the pre-existing frequency of micturition. As the muscular fasciculi lose their contractility from backward pressure, and fibroid interpenetration ensues from interstitial inflammation, more residual urine collects, and a greater amount of irritation is thus evoked.

To these causes may be added the occasional extra-irritation of stone, free or encysted.

I shall now place before you instances of both forms.

CASE 60. Enlarged prostate with atony to one and a half pints; great frequency; hæmaturia; recurrent calculus; catheter; relief.—I take an especial interest in this patient, for he is one of my mistakes in diagnosis. I have watched him since 1884. He is now seventy-eight. Twenty-five years ago, that is when he was fifty-three years of age, he came to this hospital with retention of urine, apparently the result of prostatic congestion. He was relieved by catheter, regained his vesical power, and did not feel any further inconvenience until January, 1883, when dribbling of urine commenced, and culminated in October, 1883 (that is eight and a half years ago), in a sudden attack of hæmaturia. He was admitted here under one of my colleagues of that time, and finally he appeared in my out-patient rooms complaining of frequency of micturition, hæmaturia, and the occasional passage of small phosphatic calculi. I found him, according to my notes, “a decrepit old man, with well-marked arcus senilis, whitish hair, enlarged prostate. A catheter is used night and morning, but as the stream is sometimes strong the use of the instrument is occasionally omitted.”

In February, 1884, I lost sight of him, and I subsequently found he had placed himself in the hands of one of my colleagues at St. Peter's Hospital (Mr. Coulson), who had performed median lithotomy, and had removed a number (thirteen) of small stones from a post-prostatic pouch.

In passing I will admit I ought to have sounded him, but one often puts off such matters in the hurry of general surgical out-patient practice, and I naturally relied upon my senior in the hospital to have excluded calculus. The lesson was sharp, but very beneficial. Since then I have made it a golden rule never to permit a patient suffering from vesical catarrh and urinary obstruction to remain unsounded for longer than a period of six months. But to return to my patient.

Since 1884 the stones have recurred six times, and every time they have been multiple. Once, for curiosity's sake, I examined with the electric cystoscope, and saw a post-prostatic pouch like a quarry with a number of glistening, white, faceted stones in it. He has only vague symptoms of these collections. He usually appears saying that “he has a feeling of distress or inconvenience in his bladder, which makes him think he is forming stone.” He is, thereupon, sounded, and multiple stones are detected and crushed. After each litholapaxy his bladder is cleaned up with washing, and he usually leaves the hospital holding his water for nine hours at night and five or six in the day.

CASE 61. Enlarged prostate with contraction of the bladder.—A patient, æt. 63, was sent me by Dr. Goodson, of Leytonstone, with extreme irrita-

bility of the bladder, the result of enlarged prostate. He stated that up to the age of fifty-eight he was in capital health. At that time he was going to Yarmouth by boat, and got chilled in a sea fog. Frequency of micturition set in, and culminated in retention. After twelve hours' extreme distress he was relieved by catheterisation, and since that time he has never passed urine properly. For the first two years he micturated a little, but used the instrument every four hours, and for the last three years he has had to rely solely upon his catheter.

When he consulted me he was drawing off his urine every two hours, day and night. The urethra was inflamed and exquisitely tender; the bladder was contracted, and only held three ounces; the prostate was very large, and it was with difficulty that I approached its upper end with my index finger. Nothing I could suggest in the way of medicine or bladder washing gave him any relief. He would not hear of supra-pubic drainage, and I learnt subsequently that he died, worn out with his sufferings.

You may be interested in the course of the following case, the progress of which was watched by means of electric cystoscopy by myself and my colleague Mr. Swinford Edwards, under whose care the patient was. You will notice the early age* of the patient, the afternoon painless frequency, the gradual growth of the left lobe, and with it the increasing frequency and obstruction.

CASE 62.—I was asked by my colleague Mr. Swinford Edwards to examine a man aged 50* with the cystoscope, and ascertain the cause of a distressing frequency of micturition from which he was suffering. The history I obtained from the patient was as follows:—In the summer of 1885, being then forty-six and a half years of age and in perfect health, he was greatly excited one night at a fire which took place opposite his house. He stood in the midst of the water from the fire-engine in slippers and without stockings. He thinks he was thoroughly chilled, and a week after he found one night on going to bed that he was quite unable to pass water. He was relieved by means of a catheter next morning, and had no further trouble until a week or a fortnight later, when he noticed that towards four o'clock in the afternoon he had repeated calls (every half-hour) to micturate, passing only a little urine at a time. This afternoon-micturition persisted. Water was muddy,

* Note on the age of patients with enlarged prostate:

Sir Henry Thompson stated that enlargement of the prostate does not take place before fifty-three ('Diseases of the Prostate,' 5th ed., p. 64). Belfield, McGill, and others have operated upon enlarged prostate at earlier ages. I have myself met with it several times between the ages of forty and fifty, and have removed superficially a piece the size of a large monkey-nut from the left lobe of a gentleman aged fifty-one; a middle lobe, size of a small chestnut, at fifty; and have encountered superficially so general an enlargement at fifty-two that I had to use the cautery to make a trough posteriorly. Mudd, of St. Louis, exhibited in 1890 an enormous fibro-myomatous prostate sarcomatous (Appendix Q) taken from the body of a negro aged twenty-seven, and lately (1892) he has brought forward the case of an infant with undeniable overgrowth of the prostate, of the so-called "*senile*" type ('Medical Fortnightly,' Jan., 1892). The general impression now is that enlargement may occur *about* the age of fifty.

but there was no pain and no blood. Coincidentally with this he began to be disturbed at night (every hour), and he had pain along the canal on micturition. Sexual connection produced a terrific pain, which shot from the anus to the tip of the penis as the semen was leaving him. There was no blood in the secretion. We may interpret these symptoms as pointing to a sub-acute inflammation of the prostate, probably the result of exposure. He gradually improved, the frequency got less, the night call ceased. After a lapse of some time he noticed that he was gradually "saving water in his bladder;" that is, though feeling full of urine, he had no inclination to pass it. Once, after neglecting to empty the bladder for a long time, he found it impossible to do so when he attempted to urinate. A catheter was introduced, and a quart of water was drawn off. He again recovered power, but the frequency reappeared. He came under my notice in October, 1889.

His frequency was then every half-hour during the day, and seven or eight times at night. The urine was passed with straining. It was acid, 1015, no albumen, a little mucus. Five ounces of residual urine were found. The prostate as a whole was small and hard, and the left lobe was slightly nodular and very tender. On cystoscopy "the bladder surface was of a light senna-brown or fawn colour, the fasciculi were enlarged, and dimples and depressions existed between them. The edge of the mouth of each small hernia was of a different colour to the rest of the surface. A broad rim of milk-white opacity surrounded them, just as if wax had been laid round each opening. On the posterior wall were blood extravasations."

In a fortnight's time, with washing, the patient held 10 ounces of fluid easily, but still complained of a constant irritation in the urethra and neck of the bladder, causing him to urinate every two hours in the day and four times at night.

Electrolysis of the bladder (10 milliampères for ten minutes weekly) relieved the frequency for a month, but it recurred, although it was noticed that the residual urine had decreased from 5 oz. to 2 oz.

Second cystoscopy.—I examined the patient again in six months' time (June, 1890). He was then passing water every half-hour with pain at the end of the penis. "The urine dribbles away. The prostate is irregularly enlarged, though a No. 7 Jacques can be passed. There is a long latent period. On cystoscopy pieces of phosphatic grit are seen sticking in between the fasciculi. The wax inlay colour has spread over the entire surface, replacing the fawn-colour. Is this fibroid tissue interpenetration? By the right ureter there is a small sacculæ forming. (4 oz. distension was used). *No growth of the prostate into the bladder was remarked.*"

Third cystoscopy, December, 1890.—"There is a shallow post-trigonal pouch (4 oz. distension used). A rounded outgrowth is now forming on the left lateral lobe; it is encroaching slightly on the anterior urethral rim. Its surface is covered with gelatinous mucous membrane, in which dullish coloured veins are seen. The surface of the fasciculated posterior wall is blurred. Small pouches now replace the dimples between the fasciculi, glistening white concretions project from between the mouths of those situated in the post-trigonal pouch."

Fourth cystoscopy, June 17th, 1891.—"He can retain his urine for four or five hours when sitting down, but directly he rises he wishes to micturate, and when he attempts this he cannot pass more than a table-spoonful, and suffers some pain in the act right along the penis and at the end, but it is not severe. He has, moreover, to stand for three or four minutes 'to coax it away.'"

"If he is standing and at work he has to urinate every half-hour, and to get up four times at night, beside using the catheter. When he rides on an omnibus or in a train, or is shaken at all, he is forced to wait 'and let the parts settle' before he can pass water. For instance, he will walk about a little, or stand and humour the water until a table-spoonful comes, and then he is relieved.

"He uses the catheter at four o'clock in the morning, drawing off a pint of urine, for if he used it at ten o'clock before going to bed he would only be able to remove 5 oz. A year ago he could pass water on his side in bed, now he must rise to strain. No pain on jolting or walking, nor, indeed, any at any time unless he attempts to pass water.

"*Cystoscopy*.—Urethra easily traversed. No prostatic enlargement as felt *per rectum*. But on introducing the light a large intra-vesical prostatic outgrowth of the left lateral lobe can be seen. It has a smooth gelatinous surface, and the mucous membrane is very rich in vessels. The right side of the bladder has been greatly stressed, the diverticula are larger. 5 oz. of residual urine."

Fifth cystoscopy, October, 1891.—"Bladder greatly fasciculated, the muscles being broad like miniature ribs, many pockets or diverticula. Intra-prostatic outgrowth of left lobe now the size of a chestnut. Its surface mucous membrane is very lax, like the skin of an old man's face. In it are long loops of vessels, which showed me that the gland is capable and has been in the habit of altering in size. No calculous formation."

The patient consenting to operation, my colleague Mr. Swinford Edwards performed supra-pubic prostatectomy. The bleeding was profuse, welling up from the bladder rapidly, but it gradually subsided. The patient had no rallying power. There was no rise of temperature, but he got weaker and died. Autopsy showed old cystitis, upon which a recent acute attack had been grafted. Ureters were not dilated. Kidneys were slightly granular and congested. There was a small quantity of pus in the pelvis of the left.

My comment to you upon this case is that the left lobe had been pressing upon the prostatic urethra, and had been obstructing the outflow of urine before it appeared raised above the surface of the trigone. Nor was its irruption apparently marked by a diminution in the symptoms. It is noteworthy that the stony material sticking in the fasciculi were found towards the base, and did not lead to permanent encysted stone.

Treatment of the Frequency of the Enlarged Prostate.

As the frequency of micturition is due either to the irritation of the growth of one or more of the prostatic lobes, or to the obstructive vesico-renal changes which such a departure from the normal state induces, it is obvious that the treatment of the symptom must be directed either against the obstructing gland (operative) or against the inflammation and dila-

tation of the bladder which is caused by the impediment (palliative).

Palliative.—The greater number of your patients will live in tolerable comfort with aseptic or cleanly catheterism, with careful dieting and occasional courses of medicine and irrigation.

The irritability of the bladder in the first stage, which is partly due to direct irritation, partly to obstruction, and in some cases to over-secretion of urine by the reflexly stimulated kidneys, is often under control of smooth muscle stimulants such as the extract or tincture of *nux vomica*, liquid extract of ergot, or the liquid extract of *Hydrastis Canadensis* (mv—x). I prefer *nux vomica*, but when it does not agree, as in patients who are indifferent sleepers, I give ergot or *hydrastis*. In exhibiting *belladonna* you must carefully distinguish between spasm of the neck of the bladder and the frequency due to a labouring muscle. *Belladonna* places the latter *hors de combat*. As a rule *belladonna* is unsuited for atonies of all forms, and *may induce an attack of retention*, especially if it is given by the bowel. The bowels must be carefully regulated, and all tendency to constipation should be guarded against. A pill of aloes and opium, or of *cascara sagrada* is the most reliable.

There is often a good deal of muscular spasm in the deep urethra, and my colleague Mr. Harrison has invented a bougie called bougie à ventre, which he considers is of value in the early stages of the enlargement.

Professor Keyes speaks well of a deep urethral instillation of nitrate of silver (p. 147). Three drops of a solution of a strength varying from $\frac{1}{2}$ gr. in the ounce up to gr. x or more in the ounce are used at intervals of two or three days up to a week or ten days.*

Supposing no residual urine exists, is it wise to instruct a patient with enlarged prostate in the use of the catheter? To those who are not able to obtain prompt medical assistance, and even to those in large cities, it is, I think, best to explain the causes and symptoms of retention, and to instruct them how to pass a soft catheter. I quite agree with Professor Keyes when he says, "If there is no residuum, still, with the slow advance of the disease, a time is pretty sure to come when there will be a certain quantity, or when, from the effect of cold, irritating urine, or other cause, retention may

* Consult a paper on this subject by E. L. Keyes, 'New York Med. Journ.,' May 28th, 1887.

come on. It is a rule with no expectations, that a patient with hypertrophied prostate is never safe unless he can pass a catheter for himself, any more than is a patient with hernia who does not wear a truss."

Frequency when Residual Urine and Cystitis are present.

A small amount of residual urine under an ounce does not in itself require the habitual use of the catheter, but when a moderate amount of residual urine is present (4 to 6 ounces), and chronic vesical catarrh co-exists, washing out the bladder is not only productive of great comfort, but also prevents the deposit of calcareous material upon *débris* and the formation of stone.

In testing for residual urine the patient must stand and urinate, having previously held his water as long as possible. He is then placed upon his back, and a rubber catheter,* (Jacques No. 10), warmed and oiled, is gently insinuated into the bladder, and the water drawn off into a measure glass.† If the patient is accustomed to the use of the instrument, and can stand without feeling faint, it is wise to hold the catheter horizontally, so that you can estimate roughly the propulsive power of the vesical muscle. If the urine shoots out with force, it is to be expected that the bladder muscle will regain some of its energy under new and non-obstructive conditions (*vide* Operation, p. 183).

It is an invariable rule with me, and should be with you,

* If the patient has never had an instrument passed before, it is wise to use a new catheter which has been syringed through with very hot water. For a lubricant pure olive oil is perhaps the best. Carbolic oil, 1 in 20, is apt to irritate, beside being useless as a germicide.

† *Precautions in measuring residual urine.*—Certain precautions are to be observed in ascertaining the amount of residual urine. They may be appropriately alluded to here, for their neglect will be productive of error. 1. A blood-clot or plug of mucus, or a previously blocked catheter, will cause the practitioner to register *no* residual urine, whilst a clear instrument may withdraw many ounces. 2. It is of the utmost importance, in order to secure accuracy, that the patient should hold his water for some time previous to the examination. *If a slightly atonic bladder be partially empty when the patient starts to urinate, a great deal of the mechanical force obtained from the counter-pressure of moderate distension is lost. The ejected urine will therefore be small in quantity and the residual large.* The following case is an example:—H—, aged 45. After three months' use of a No. 12 (English gauge) steel bougie, the bladder was examined for residual urine. Nearly 3 oz. were withdrawn. The next sitting (one week after) he volunteered the statement that he had this time kept his urine for four hours in order to get "a head of water on." He said he had noticed that a "fullish bladder" gave him power to expel the whole of the urine. He passed urine, leaving only 8 minims behind in the bladder.

never to draw off even a few ounces of residual in a prostatic case, unless I can keep the patient warm and quiet for the rest of the day, or in bed for a few days if the residuum is over six ounces.

The character of the residual urine will guide you as to the nature of the washing required. If the water is clear, acid, and not smelly, the catheter alone is needed; if muco-pus be present, the solutions used for cystitis (p. 122) may be tried. I am convinced, with an experience of nearly ten years of iodoform mucilage, that no injection will serve you so well as an emulsion of this substance; that if it fails to relieve there is not infrequently an undiscovered irritant, such as chronic prostatic inflammation, encysted stone, or some deposit of carcinoma or tubercle present.

Dangers of Injudicious Initial Treatment of Residual Urine.

I have already briefly alluded to the danger of hæmorrhage in removing large amounts of residual urine in men over fifty (p. 82). There is, however, another complication, which becomes more formidable and fatal as the residuum increases. I refer to urinary fever, the so-called "catheter fever." Constitutional disturbance is often met with in a mild degree on the withdrawal of even small amounts of residual urine.

On the catheterisation of moderate amounts of residual urine, parenchymatous processes of the urinary organs, as Ultzmann* has said, are sometimes met with. The patients are usually confined to bed, and are feverish. The urine is relatively only slightly clouded with muco-pus, and contains only a correspondingly small amount of albumen. A slight rigor suddenly appears, that is soon followed by a second and a third, but after the evacuation of a large amount of pus with the urine there is improvement. This improvement, however, only lasts a short time, for soon the rigors recommence, but again subside after repeated evacuations of pus. This alternating course may last weeks and months, until finally permanent improvement ensues or until the patient dies. If the patient recovers, there is in the urine constant evidence of cysto-pyelitis, which passes gradually but slowly into a nephritis.

It is, however, in the advanced cases of prostatic atony, where the residuum is large and clear, that the urinary fever may become rapidly fatal.

* 'Pyurie,' p. 68.

Three questions and their answers will be sufficient to indicate the dangers and the treatment.

What sort of patient with prostatic enlargement do you view with apprehension?—A patient about sixty years of age, with anæmic lips, with a face of a leaden hue, with short breath, capricious appetite, and morning nausea or retching; a patient who is feeble in his walk, failing in his bodily vigour, forgetful in his business, and drowsy over his occupation; a patient who consults you for frequency and urgency of micturition in the daytime and incontinence at night, whose prostate *per rectum* is comparatively small and hard, whose bladder you find by percussion to be distended nearly to his umbilicus with residual urine, and whose water you note as being clear, limpid, light-coloured, copious, of low specific gravity, and free from albumen and sugar,—that is the patient you do not care to be entrusted with. Such a patient, when I see him, I regret that he has not placed himself in the care of another, for I anticipate a week of great anxiety when I introduce him to catheter life.

What are the dangers?—Much has been written upon the need for care, warmth, and asepticity of catheter. Believe me, gentlemen, no amount of scrupulous care and forethought, no attention to detail, can prevent a mortality. You will save a proportion, but a percentage will die, and the discredit will be at your door.

(a) *Immediate death.*—This is avoidable. Death has been known to follow immediately upon the withdrawal of a *large* amount of residual urine. It has even occurred in the consulting room of one of our first urinary specialists. The death is due to cardiac failure. No large amount of fluid, whether it be pleural, pericardial, peritoneal, hydrocelic, or vesical, should be removed *quickly* or in the vertical posture.

Never draw off all the urine at the first sitting; leave a half or three quarters of it behind—gauge it by percussion. There is an additional reason for doing this, in that it gives the over-stretched, toneless, smooth musculature a chance of contracting.

(b) *Rapid death.*—A low form of inflammation of the bladder, which rapidly ascends the ureters into the dilated kidneys—an ascending pyelitis, which is perhaps unmarked by any temperature, may remove your patient within the week. Usually, after the second or third introduction of the catheter, the patient feels chilly; he is restless, refuses food, and goes

to bed early. His urine, which before the commencement of the catheter was clear, is now slightly murky, but acid. Next day the symptoms are still indefinite, the malaise and anorexia is perhaps more marked, the temperature may have risen to 100° ; the urine contains a little pus and mucus, and bacteria of decomposition are seen in freshly drawn specimens.* The next day the tongue is dry, the patient keeps his bed; he has been restless and talkative in his sleep during the night, but he knows you, and complains of his throat. A whitish patch may be seen on the tonsils—that is a septic patch. The patient now becomes rambling in his talk, only semi-conscious, and passes into a low state of muttering delirium with lucid intervals, moans when the catheter is passed, and occasionally groans as if in pain. The urine is gradually decreasing in amount, he becomes comatose, and dies. I have had two such deaths in my own practice, and have watched others.

(c) *Remote lethal effects.*—There are other cases in which the kidney recovers itself, probably owing to the fact that the disease has not involved the whole of the secreting structure; the patient struggles through the crisis, and you congratulate yourself that it is due to the care you have taken, or the remedies you have employed. I am sure, however, that in many cases the seeds of an interstitial nephritis have been sown which will bear fruit later on, and the renal functions will suddenly break down on some slight cause, such as a slight fray of the prostatic urethra with a rough catheter, and the end will be rapid.

What are the precautions to be adopted in every case of residuum?—Care is bestowed upon the catheter. It should be new, and disinfected by means of boiling water, or if a soft Jacques is used it should be left in carbolic lotion, 1 in 20, for some hours before being used, and thoroughly washed in very hot water immediately before it is introduced. Only half the residual urine is withdrawn at the first sitting, and its place

* Sometimes it is observed, when the sediment is thoroughly examined with the microscope, that a growth of bacteria is rapidly progressing. Not only are single, small, two- and four-limbed bacteria seen in vigorous motion, but whole clumps and shreds are brought to view by the microscope, which consists of motionless bacteria massed together. These collections of bacteria, when from the bladder, appear in large, irregular, membranous masses; but if they have been compressed in the kidneys they tightly plug the tubules, and when such plugs of bacteria pass off with the urine they appear under the microscope as beautiful cylindrical casts, which consist entirely of motionless bacteria (*nephritis parasitica* of Klebs). The prognosis is almost always in these cases unfavorable (Ultzmann 'Neuroses of the Genito-urinary System,' translated by Allen, p. 67).

is partially taken by introducing 4 ounces of warm boracic water* by means of a disinfected Arnold syringe (p. 74). At the next sitting all the urine may be withdrawn, and the bladder washed out with borax lotion and 4 ounces of the same solution left in.

When tolerance has been established, the patient should be instructed how to pass his catheter. It is wise to impress upon him the need for cleanliness and for being careful about the state of the catheter, lest it becomes cracked or the eye worn and frayed. Some men court danger and escape it. I may mention to you that one of my old teachers, who was a brilliant operator in this hospital, used to carry his catheter loose in his waistcoat pocket, used to retire into the surgeon's room before operating, *spit* upon the instrument, and pass it with the greatest nonchalance. I have heard of others who ran equal risks of septic introduction without incurring danger. In these fortunate men I believe there is no pabulum for the bacteria to fasten upon, and that the prostatic gland is uninflamed, and the urine very acid.

The Expediency of dealing with Advanced Prostatic Atony.

You might well ask the pertinent question, If these be the dangers which a patient with an advanced prostatic atony has to encounter, would it not be better to avoid them by leaving a large residuum alone? By steering abruptly from Scylla you plunge into Charybdis. Your patient will perish from backward pressure upon the kidney, uræmic coma probably closing the scene.†

When such a patient applies to me for treatment of a far advanced prostatic atony, I explain the crisis he must pass through before he can be well; I lay stress upon the fact that he must continue the catheter for the rest of his life, and I then leave the matter in his hands to decide. If he finds his life unbearable from the discomfort he is forced to endure,

* Borax ʒij to the pint of *boiling* water; cover vessel with a piece of lint steeped in carbolic solution 1 in 20, and use warm.

† It is rarely the medical attendant who is to blame for permitting large amounts of residual urine to accumulate. I have met with several cases in medical men, in whom one would suppose no such neglect could possibly take place. They were quite unaware of what had happened, although their tailors had pointed out to them the gradual increase of belly girth, without a corresponding increase in shoulder breadth. I am convinced that in many of these cases the sentient surface of the bladder is dulled, and if the patient is unobservant or much engaged in business the first symptoms noticed may be frequency in the daytime and incontinence at night.

and prefers to run the risk of introduction to catheter life, and his friends are warned of the danger he must encounter, I arrange for him to remain in bed, warm and well nursed, and proceed on the lines I have already laid down. But in some men over eighty I have advised them "to bear those ills they have than fly to those they know not of." Both the cases I have mentioned as having died under my care were far advanced atonies of prostatic origin.

The Medicinal Treatment of Cystitis and the Residuum of the Enlarged Prostate.

There is but little to add beyond that mentioned on page 121. I place a certain amount of faith in salol, but it often has disappointed me.

Gross and Harrison speak well of the *Ulmus fulva*, the slippery elm, as a good demulcent. The latter also recommends a combination of infusion of uva ursi and hops, with a little carbonate of soda added. He has remarked that the common blackberry exercises a sedative effect on the mucous membrane of the urinary passages,* and advises it being given in the form of a drink to relieve thirst.

Operative Treatment of the Enlarged Prostate.

The greater number of cases will live comfortably with the use of the clean catheter, and an occasional washing of the bladder.

But if the catheter treatment fails; if, in spite of care and cleanliness, chronic cystitis supervenes, and the pain and frequency of micturition, despite the catheter, becomes intolerable, what operative measures are at the disposal of the surgeon?

(1) The passage of the catheter may be facilitated by a permanent perinæal opening (Whitehead's method). Six inches of sensitive urethra are thus saved from the irritation of the instrument, and the bladder is rendered more readily accessible and is more easily washed out.

(2) Or a Jacque's tube (like an œsophageal feeding tube) may be passed through the perinæal incision until the eye lies just within the bladder. It is then secured in position by means of tapes, and the other end brought up between the legs and hitched in the waistband. When the patient wishes to relieve his bladder he turns the tap of the stopcock which

* Harrison, 'Surgical Disorders of Urinary Organs,' 3rd ed., p. 357.

is placed at the end, and directs the opening downwards. (Annandale, Harrison).

(3) Or the bladder may be relieved by permanent supra-pubic drainage, as recommended by Sir Henry Thompson, the wound being fitted with an apparatus to conduct the urine into a urinal.

(4) Or an artificial supra-pubic urethra may be created (Hunter McGuire's operation). "The supra-pubic opening into the bladder is made as low down on its anterior wall as possible. A drainage-tube is kept in for a short time. The result is that the patient passes his urine through the artificial urethra thus formed. According to the reports of the operation the artificial urethra does not leak, nor does urine dribble away, no matter what the position of the man's body. The urine is retained for several hours, often from four to six, and then passed in a steady stream thrown several feet from the body, the last coming in jets as from the natural outlet. The artificial urethra, or fistula, has the same relation to the bladder that the spout of a coffee-pot has to the pot."

Such operations are often effectual and sufficient. If, however, the surgeon aims at a permanent cure, or if drainage should fail, he must adopt more radical proceedings, and remove the obstructing portion of the prostate. What methods are available?

(1) Urethral prostatotomy—section through the middle lobe or bar by means of an urethral instrument. (2) Urethral prostatectomy (Mercier's operation)—removal of part of the obstructing lobe through the urethra. (3) Galvano-caustic prostatectomy (Bottini's operation), also performed through the urethra. (4) Perinæal prostatotomy (Harrison's operation)—median perinæal section with division of the floor of the prostate and subsequent drainage. (5) Perinæal prostatectomy—removal of the salient portions of the gland through the same route. (6) Supra-pubic prostatectomy (McGill's operation).

Which of these three routes—the urethral, perinæal or supra-pubic—should be chosen?—It is generally conceded that the treatment, to be effectual, should (1) for a time thoroughly drain the bladder, and (2) permanently remove the cause of the obstruction.

The urethral route is now judged to be in many ways unsatisfactory. There are few if any cases recorded, if we except Bottini's statistics, in which the operation has proved satisfactory by this route. Neither can the obstruction be thoroughly removed, nor the bladder be subsequently drained.

Which then is the better route, the perinæal or the supra-pubic?—The greater security afforded by the improved method of supra-pubic cystotomy and the successful results obtained by this method have enlisted a feeling in the profession strongly in favour of the high operation. It is, moreover, contended that by the latter route (*a*) enucleation of the gland pieces can be performed with greater precision, and completed with greater certainty; (*b*) complete and most efficient drainage is ensured; (*c*) the high operation is more generally applicable and is equally safe.

There is much to be said in favour of the perinæal route, and the final decision must at present be left to time, increased experience, and more certain diagnosis of the exact condition of the intra-vesical growth.

Doubtless in the future each variety of intra-vesical growth will be approached by the route indicated by experience rather than by fashion, the pedunculated median lobe being attached by the perinæum, and removed either with the snare, forceps, amygdalotome of Weir or Norton, the *écraseur* of Tobin or my own, whilst more extensive removal will demand the greater freedom and precision afforded by the high operation.

What are the risks of the operation?—My colleague Mr. Mansell Moullin* has shown that in thirty-eight reported cases of perinæal operation for the removal of the growth only three died; and he gives it as his opinion, after a careful review of the literature, that perinæal prostatectomy, “without necessitating an appreciably greater risk, confers upon the patient a degree of relief with which that following mere cystotomy or drainage offers no comparison. The patient, in a very large proportion of cases, recovers complete control over his bladder; he is able to empty it thoroughly and at will without an instrument, and even in the failures—even in those cases in which a fistula is left, or in which the sole benefit gained is the easier introduction of a catheter—he is no worse off than if the establishment of a permanent fistulous opening and nothing more had been the object in view.”

He adds, “The supra-pubic operation stands on different grounds. Taking all the cases together, the mortality is approximately 20 per cent.; if the last half only, it is still 15 per cent. This, it must be admitted, is a very serious matter; and although it is to be expected that the proportion

* Mansell Moullin, ‘The Operative Treatment of the Enlarged Prostate,’ p. 50.

will fall considerably lower—at least, in the hands of those operators who are practised in the performance of it—it is probable that it will always remain higher than the other.”

Your patient will doubtless inquire of you, when you broach the subject, what the chances are of his bladder recovering its power after the removal of the obstructing gland.

You remember that Sir H. Thompson has said, “When it has been necessary to practise habitual catheterism for retention from enlarged prostate for two or more years, the coats of the bladder lose their power, and are incapable, I believe, of regaining it in any case after that lapse of time, and would fail to expel their contents even supposing the obstruction to be entirely removed.”

When Mr. McGill introduced supra-pubic prostatectomy to the profession at the Leeds meeting of the British Medical Association he traversed this statement, and asserted that Sir Henry Thompson’s dictum, “that a confirmed atony of the bladder consequent upon prostatic enlargement is *incurable* even by the removal of the obstruction, is a fallacy founded upon a false hypothesis.”

Dr. W. T. Belfield, of Chicago, claims that accumulated clinical observation has proved—(1) That in most cases the failure to evacuate the bladder is due in no wise to degeneration of the vesical muscles, but solely to the mechanical obstruction offered by prostatic growths, since the removal of such obstacles has been followed in over two thirds of the cases previously dependent upon the catheter by restoration of the vesical functions. (2) That the prostatic obstruction is usually of such form as to permit excision; for out of seventy-seven cases in which supra-pubic section was done, in sixty-two such obstacles were found and removed.

He admits, however, that in many prostatics of advanced age a degeneration of the vesical walls co-exists, so that the contractility of the bladder is much impaired. Evidences of general tendency to sclerosis, as shown by rigid arteries, polyuria, often hæmaturia, extremely hard prostate, feeble flow of urine through catheter, and complete evacuation of the bladder only by pressure upon the hypogastrium, are the symptoms that point to degeneration, and render operative interference unpromising.

Dr. Weir,* of New York, declares that in his judgment the removal of obstructions of prostatic origin will afford the

* ‘Journal Am. Med. Assoc.,’ March 12th, 1887; cf. ‘Medical Record,’ March 10th, 1888.

greatest success in those in whom the interference with urination has lasted but a comparatively few years, and where the secondary changes in the kidney have not advanced to a very serious extent.

My own experience in this subject is as follows :

(1) Whenever the prostate is small *per rectum*, and hard, the supra-pubic removal will be performed with difficulty and with doubtful success, even if the operation has been undertaken early.

(2) Whenever long-standing prostatic pain due to prostatic inflammation has been complained of, the prognosis of the eventual recovery of the bladder is graver.

(3) If on introducing a catheter into a prostatic of confirmed catheter habit, the efflux stream is seen to be strong, and to form a good parabola, it augurs well for the recovery of the muscle power if the obstruction is removed.

(4) If the patient has sexual capacity left, and does not suffer pain during the final act of congress, the prostatic wound may be expected, *cæteris paribus*, to heal readily.

As an illustration of the value of supra-pubic prostatectomy in suitable cases I will show you the following :

CASE 63.—This patient, R. J—, æt. 50, had suffered for $2\frac{1}{2}$ years before he came under my notice with chronic prostatic retention. He stated that it commenced at the age of $47\frac{1}{2}$ with a frequency of micturition and an aching supra-pubic pain when he passed water; this was relieved by the act. The stream would be small at first, and then grow larger as the bladder emptied itself. He had to strain greatly. His frequency was every hour in the day, and every hour and a half at night. Gradually the urine became thick, and a deposit settled. He was sent to a London hospital, where the bladder was drained by perineal incision for six weeks, but without relief. A catheter was given him, and he has been dependent on it ever since. He then applied at another institution, where he was treated by means of medicines. He then had a course of vesical irrigation, but this neither improved the bladder nor reduced the thickness of the water. When he came under my care his urine contained half pus of pyelitic character, but the amount varied. He was passing his catheter three or four times in the day and once at night. He could not urinate at all. With the electric cystoscope I saw an hypertrophied bladder and a gelatinous-looking median lobe the size of a chestnut. I tried Bottini's operation, but failed to relieve his chronic retention. I therefore did supra-pubic prostatectomy, and as the mucous membrane covering the intra-prostatic outgrowth was very vascular, I used this prostatic écraseur (Fig. 16), which I had made for me, and which I usually employ to avoid bleeding. It is merely a non-fenestrated lithotrite, with the male blade cut short, and the stump turned up into a hook. A loop of silk or wire is passed through the little *débris* hole at the base of the beak of the female blade, and the ends hang loosely out at the handle. The loop is drawn a little way through the hole, turned over the beak, and pulled taut. It is then introduced into the urethra, and encounters the finger passing

through the supra-pubic opening. The nail of the finger (or a button-hook introduced into the bladder alongside the finger) pulls the loop off the beak and drops it over the enlargement, and holds it thus in position whilst the

FIG. 16.

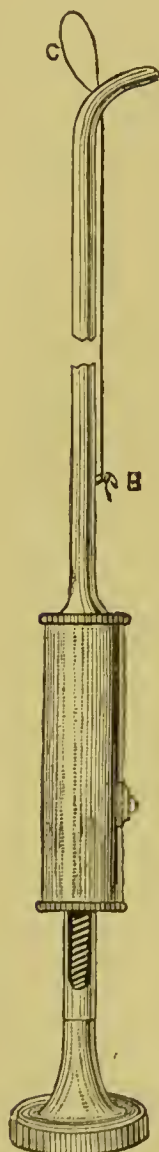
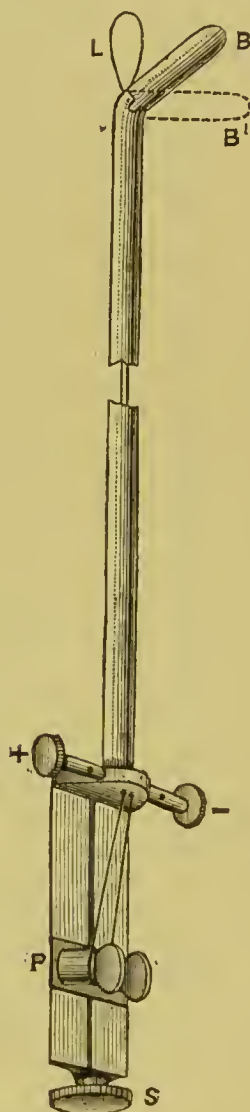


FIG. 17.



assistant pulls at the ends of the loop or attaches them to the hook and turns the handle. This tightens the loop and cuts off the lobe. Leiter of Vienna has made me a galvano-cautery loop which works on the same principle (Fig. 17).

The patient rapidly recovered, and now expels his urine with great force.

He does not need a catheter, and though it is a year since the operation he has had no further difficulty with the bladder. I am now about to attack the left kidney, and to wash out the ureter in order to check the pyelitis.*

Carcinoma of the Prostate.

Carcinoma of the prostate is said to be a rare disease; only 114 have been collected from the literature.† I do not believe that the disease is now so seldom met with as it might possibly have been some years ago. I have had probably more than twenty cases under my care. I am certain of fifteen of these, and we will glance at the table directly. The early manifestations of cancer of the prostate are so essentially like those which we have just been discussing, viz. those due to enlargement of the prostate, that we are insensibly led to consider the clinical features of the malignant gland immediately after that of the benign.

Pathologically and clinically this disease is separated into two groups; (a) the hard growths and (b) the soft growths of the prostate.‡

The former usually exhibit the tactile and visual characteristics of the so-called scirrhus of the breast, and the latter those of encephaloid disease of the same organ. I will admit that this is not a scientific grouping; it is practical, however, and my aim is to give you clinical practical instruction rather than to deal with the microscopical detail.

Note how different the symptoms of these two varieties are.

(a) The hard scirrhus-like prostatic growth is the commoner (ten out of fifteen cases). It commences insidiously after fifty years of age. The tension of the neoplastic infiltration upon the prostatic capsule and upon the inlying urethra induces first a slight obstruction to the stream, then a frequency of micturition by night as well as by day, then

* This patient had nephrotomy performed in October, and a tube placed in the pelvis of the left kidney; the tube was flushed with a solution of corrosive sublimate, 1 in 6000, every day. On the second day the water suddenly cleared. Previously the amount of pus varied from $\frac{1}{2}$ to $\frac{1}{4}$. It remained clear as long as the tube was *in situ*. The case was going on well as this passed through the press, but the tube had been removed, and the pus showed signs of recurrence.

† Engelbach, 'Les tumeurs malignes de la prostate,' p. 12.

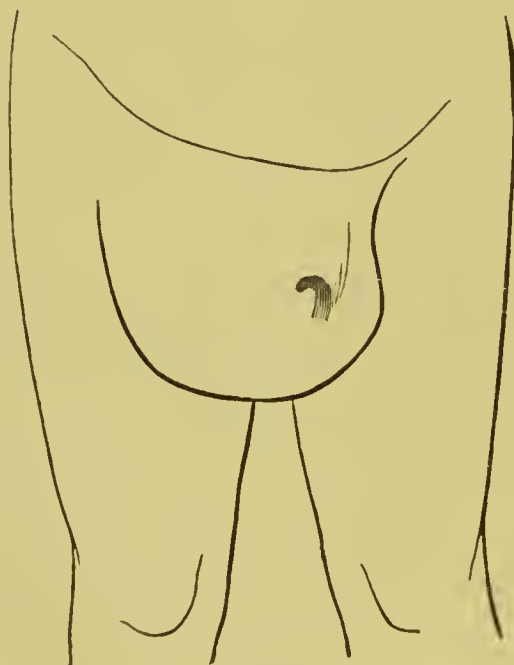
‡ I purposely avoid a scientific classification. From the microscopy of my own cases I believe sarcoma of the adult to be more common than is supposed. It is impossible as yet to group clinically the symptoms of the microscopical varieties of the adult malignant prostate. Compare Appendix R.

increased obstruction,* which culminates in retention or in incontinence. The hæmaturia is usually slight (*vide* p. 50). The growth finally breaks through the capsule of the gland posteriorly where it is weakest, replacing it with new growth, and spreading in a particular direction, not towards the rectum so much as towards the vesiculæ seminales, and along the track of the ureter. At the period of this escape the pressure of the neoplasm upon the prostatic canal is lessened; the sufferings of the patient as regards extreme frequency and obstruction are diminished. The amelioration is, perhaps, ascribed to the medicine. Examine *per rectum*, and you will find an irregular, stony hard prostate; along one side posteriorly you will detect an offshoot of the same dense resistant material. This prolongation spreads in one direction if the disease has begun in one lobe, and it usually does in my experience.†

It throttles the ureter, and the kidney of that side suffers from backward pressure. The lumbar and inguinal glands

* The straining to get rid of the urine may be so great as to increase a pre-existing hernia to alarming proportions. Thus in one case I showed at the

FIG. 18.



Medical Society ('Trans.,' vol. x, p. 37) a small hernia (Fig. 18) had become in a few months much larger than a man's head.

† The left lobe in my list is the favourite side (*vide* list).

become hard and feelable. But long before this your patient will have been sounded for stone. The surgeon may never have entered the bladder at all, for the canal is warped, and often cannot be traversed except by soft instruments. The examination will only increase the suffering and induce bleeding, for stone is rarely present. The elastic or silk Coudée catheter will draw off residual urine, which will vary in amount according as the obstruction has been great or long in duration.

(b) The soft encephaloid-like growth is rarer (five out of fifteen cases). It progresses insidiously. Its line of march* is usually directly backwards towards the rectum. The patient complains of difficulty of defæcation, then of some slight straining in making water. But all the symptoms are first rectal, those of the bladder being secondary.

These two groups and their symptoms are illustrated by the accompanying list: the "hard" type Nos. 1—11, with a doubtful mixture No. 10; and the soft type Nos. 12—15 inclusive.

No.	Name and age.	Variety.	Chief symptoms.	Examination.	Post-mortem.	Published.
1	S. 56	Hard	"Those of enlarged prostate"	Prostate irregular, "as hard as a stone"	Entire prostate, left vesicula seminalis carcinomatous; left ureter throttled; trigone studded with erupting nodules; left lumbar chain	Path. Trans., vol. xxxix, 1888, p. 195.
2	J. M. 26	Hard; "metastatic" from left lung	Lumbago; retention; incontinence; paraplegia from a secondary spinal deposit	Unsuspected	Prostate enlarged and carcinomatous, involving bases of vesiculæ seminales	Ibid., vol. xxxviii, 1887, p. 196.
3	W. W. 59	Hard	Diminution in size of stream; small clots; great frequency; incontinence of overflow; 15 oz. residual	Left lobe and left vesicular seminalis	Left ureter surrounded; left half of trigone; left vesicula seminalis; left prostatic lobe invaded	Ibid., vol. xxxviii, 1887, p. 199.
4	S. 51	Hard	Difficulty in urination; retention; frequent micturition, unrelieved by vesical irrigation	Large, irregular, of stony hardness, especially left lobe; left vesicula seminalis involved	Lost sight of	Med. Soc. Trans., vol. x, p. 37.
5	P. 61	Hard	Difficulty in urination; symptoms of enlarged prostate	Large, stony hard prostate	Sarcoma; post-mortem	R. C. S. Museum, unpublished.
6	J. B. 60, vol. vi, o. p.	Hard	Frequency at night and difficulty in urination	None	Prostate infiltrated, not much enlarged; trigone covered as in Case 1; pelvo-lumbar glands enlarged	Unpublished.

* Many of these cases are probably sarcoma. They may have originated in the prostatic capsule. This would explain their path of growth and symptoms. But I have not sufficient evidence to offer.

No.	Name and age.	Variety.	Chief symptoms.	Examination.	Post-mortem.	Published.
7	O., 61	Hard	Slight brown hæmaturia; imperious call and frequency every 2 hours; residual $6\frac{1}{2}$ oz.	Left lobe and left vesicula seminalis hard	No post-mortem	Elcct. Ill., 2nd ed., p. 117.
8	W. H., 58 vol. ix, o. p.	Hard	Extreme frequency	Right lobe; right inguinal glands	No post-mortem	Unpublished.
9	W. G., 56, vol. ix, o. p.	Hard	Difficulty in urination, and a frequency every 2 hours; $4\frac{1}{2}$ oz. residual	Left lobe and left vesicula seminalis hard as a stone	Confirmed by post-mortem	Do.
10	G. S., 52, vol. x, o. p.	Softish	Little red clots, frequency, blood, difficulty in urination	Left lobe of the prostate enormous, bulges into anus; left vesicula seminalis involved	Living	Do.
11	G., 68	Hard	Frequency and obstruction to stream, then blood at beginning of stream	Left lobe and adjoining vesicula seminalis hard and infiltrated	Living	Do.
12	G. L., 53	Soft	Difficulty in defæcation	Cocoa-nut sized growth of right lobe breaking into rectum; colotomy; retention from pressure	Confirmatory	Brit. Med. Journ., 1887, vol. ii, p. 873.
13	T., 63	Soft	Difficulty in defæcation, straining in micturition, retention, atony	Large cystic growth of left lobe breaking into rectum; colotomy	No post-mortem	Ibid.
14	E. H., 63	Soft	Straining to micturate, difficulty in defæcation, incontinence, almost no pain	Prostate the size of a small melon	No post-mortem	Unpublished.
15	G. T., 74, under Dr. Lockhart Stephens	Soft	Blood and slime by anus, increased frequency of defæcation, no bladder symptoms; acute obstruction; colotomy refused	Bowel filled by a mass from prostate	No post-mortem	Do.

I will place before you this patient as an illustration of the hard variety.

CASE 64.—This emaciated and broken-down man is now fifty-six years of age.

In April, 1890, Mr. F. Meade Corner kindly sent him on to me here for diagnosis and treatment.

The patient was then complaining of extreme frequency of micturition every two hours day and night, from which he had suffered twelve months, of having to force to make water, and of a scalding in the urethra during micturition. His testes had been arrested in the inguinal canals. They were about the size of broad beans, the right being the larger.

Per rectum, instead of the prostate being smallish,* I found the lobes well

* I may remind you that in cryptorehids and in eunuchs the prostate is extremely small. But in those who have testicles not fully descended, but outside

developed; both were tender, but the left was the larger, and of a stony hard consistence. His stream was vertical. There was a long latent period. Four and a half ounces of murky residual urine were found. The catheter was gripped as if by a stricture, though I knew this was merely due to the concentric character of the growth around the prostatic urethra. I attempted to sound him and failed, nor did I deem it necessary to try again under ether. I wrote to Dr. Corner giving my diagnosis of hard carcinoma of the left lobe, and have had the patient under observation ever since.

I will not weary with the details of the case; suffice it to say that in March, 1891, the patient appeared, and said I was curing him, that the frequency had suddenly decreased, and that he could hold water for three and a half hours at night. The pain had diminished. He had not needed his catheter for a fortnight. I examined the prostate, and found the left lobe had lost its stony feel. It was softer and larger. The growth had broken through the capsule and released the urethra from extreme pressure.

In June, 1891, the symptoms returned. Rectal examination showed a decided invasion into the left vesicula seminalis. Blood appeared on micturition, preceding the stream.

In December, 1891, both lobes became fused.

In January, 1892, he began to fail, and the left lumbar gland became swollen and hard, and the left sciatic foraminal area œdematous (gland pressure).

He is now greatly emaciated; the prostate is stony hard, and adherent in all directions to the surrounding tissue, which is infiltrated with new growth. He passes his water every hour day and night, and with pain along the urethra and in the glans penis. He has given up his catheter, as he can get along without it.

Termination of case.—I admitted this patient into the London Hospital the 17th May, 1892, expecting him to succumb rapidly. He was greatly emaciated, and was apparently sinking; he was quite unable to look after himself, and in great distress. No instrumentation was permitted. On the 21st May he had a rigor, and the temperature rose to 107° , and he became delirious. I diagnosed left renal suppuration from ureteral throttling, and considered he would die in a few days. Blood, pus, and casts appeared in large quantities in the urine, but he struggled through the attack, and got much better. Another rigor took place a fortnight after the first, and again he relapsed, but again recovered. I sent him away in June, and he died at the end of July, 1892, three years and three months after the onset of the symptoms. I was allowed to make a partial examination.

Autopsy.—"Great emaciation; bladder full of urine, which was clear. It was extremely difficult to separate the neck of the bladder and prostate from the surrounding parts, the dense invasion being especially marked towards the left side, where many small knotty glands existed along the course of the common, external, and internal iliac vessels. A packet of glands at the left brim of the pelvis had compressed the ureter, for that part of this tube which extends to the bladder from the brim was not much dilated, whilst that stretching from the brim of the pelvis to the kidney was greatly dilated and thin-walled. These compressing carcinomatous glands were softened, and breaking down into pus. The left kidney was small and hollowed out;

the abdomen, no matter how small they are, the prostatic lobes are moderately developed. Such men often have erectile power and are able to cohabit, but they are generally sterile.

lines of suppuration radiated out to the cortex from the dilated pelvis. There were no abscesses. The right ureter and kidney were healthy.

"*The bladder.*—The connective tissue on the sides and front of the bladder was studded with small pea-sized growths, so that the surface appeared as if it was covered with a mesh of phlebolithic empty veins. On opening the viscus the walls were found thick and hypertrophied. The capacity was large. There was no stone. There was no carcinoma visible except at the trigone and around the orifice of the urethra. This opening was entirely transformed into a non-ulcerated, flat, hard, carcinomatous ring, of a lightish lemon colour. Both ureteral orifices were free.

"*The prostate.*—This was enlarged, and entirely transformed into a hard dense carcinoma, which cut and cupped like a scirrhus mamma. The prostatic urethra was infolded, not attacked."

CASE 65.*—This specimen (Figs. 19 and 20) of soft malignant growth of the prostate which I show you to illustrate the second variety was taken from the body of a patient æt. 53. The following is a brief outline of his case.

"Six weeks before his death he consulted my friend Dr. Astley Cooper for a sudden difficulty in defæcation. This was at the end of February, 1886. He had always enjoyed good health, but had suffered from a stricture of the urethra for fifteen or sixteen years, for which he was in the habit of occasionally using a bougie. There was no history of syphilis, but certain suspicious scars of an ulceration thirty years ago were found upon his legs. He was not suffering any pain. On examination *per rectum* Dr. Cooper discovered a tumour of the prostate the size of a large Tangerine orange, projecting backwards into the bowel. The tumour grew rapidly, and I was asked to see the patient in consultation on March 15th. The following note was made:—G. L.—somewhat emaciated; suffers no pain; is losing no blood either from the urethra or rectum; there is no difficulty in micturition. The rectum is occupied by a large tumour, which is springing from the prostate. The surface of the mass is smooth and covered by normal rectal mucous membrane. It is not softened in parts, but elastic throughout. It is apparently fixed, more to the right than to the left side. It is impossible to say whether the base of the bladder is invaded or not. The index-finger can just reach the upper limit of the mass."

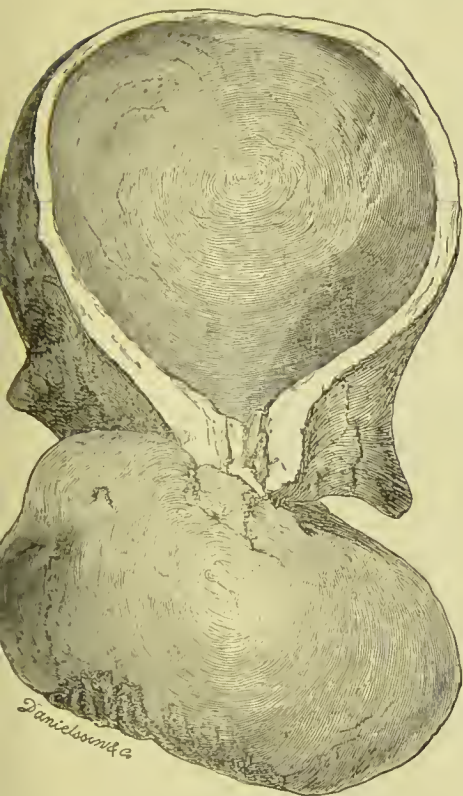
I saw him again at the end of March, and found the tumour considerably increased in size. The bowel was now almost occluded: the finger was insinuated with difficulty into the rectum, and passed over the tumour. The surface was ulcerated, and the examining finger slipped into a deepish cavity formed by the breaking down and fungating out of the growth. The bladder and urethra were displaced upwards, and the bladder had to be relieved by a Coudée catheter, a pint of residual urine being withdrawn each time. The patient was suffering extreme pain from the obstruction, and from the dribbles of liquid motions which passed over the open sore.

The recurrent hæmorrhages of a profuse character were slowly exhausting him. I therefore proposed and performed left lumbar colotomy, with the kind assistance of Dr. Astley Cooper and Mr. Thomas. The patient was greatly relieved, but sank on April 8th, just six weeks after the first onset of the symptoms.

Autopsy.—"The bladder is somewhat hypertrophied, but free from any trace of invasion of the growth; the right lobe of the prostate (Figs. 19, 20)

* This is Case 12 in list.

FIG. 19.



Growth of right prostatic lobe ; bladder opened and seen from the front.

FIG. 20.



Posterior surface of bladder ; growth of right prostatic lobe seen from behind.

is transformed into a small cocoa-nut sized mass of encephaloid carcinoma, which has fungated at its most projecting part. The *left* lobe is small for the patient's age, and quite free from any deposit: there was no deposit elsewhere in the body."

It is evident, therefore, that it is only the hard variety which you will meet with as evoking bladder symptoms ; and I am sure you should be alive to the suspicion of hard carcinoma of the prostate if in the onset of the symptoms the irritability is far in excess of the obstruction and residual urine, if radiating pain in the pelvis and legs is unremitting and unrelievable, if a sound is passed with difficulty or is unable to be introduced, and if at the same time there is a history of blood having occasionally appeared at the commencement or at the end of the stream, and the prostate *per rectum* is densely hard (stony), *enlarged*, and the

finger detects in the position of the bases of the vesiculæ seminales a corresponding infiltration.

Treatment of the Frequency of Micturition in Cancer of the Prostate.

The removal of the residual urine and systematic washing decrease the frequency slightly, but as the call is due to the irritation of the neoplasm there is no treatment which can remove the symptom which does not also remove the disease. Sedatives, particularly opium, are your only resource. It might be thought that section of the capsule from the perinæum would temporarily relieve pressure. This is so, but it only adds a scar track for the future and rapid invasion of the growth. Perinæal cystotomy and drainage is, I am sure, bad surgery. The neck of the bladder resents the presence of a tube, and more intolerable pain is caused by this manœuvre than by the disease.

Two operations only are available—supra-pubic drainage, or the removal of the entire gland and the adjoining base of the bladder. Few surgeons will admit that the latter is worth a trial.* I do not doubt in the course of supra-pubic prosta-tectomy for enlarged prostate some cancerous cases will be operated upon, and the salient and obstructing portions removed.† I need hardly say all such partial extirpations are useless, and only aggravate the disease.

Physical Irritability.

The subject of undue frequency of micturition would be still incomplete without a few remarks upon the frequency of incapacity and overflow. These are mere physical conditions. In the former the bladder is so contracted and its capacity for retaining urine so small that it must empty itself often; frequency of micturition, therefore, will vary with the activity of the kidney. The frequency of overflow is the

* Four cases are on record:

1. Billroth, 'Langenbeck's Archiv,' Bd. x, p. 548; 'Chirurgische Klinik,' Zurich, 1860-7, p. 342.

2. Nussbaum, 'Baier Aerzt. Intelligenzblatt,' No. 44, 1869.

3. Demarquay, "De l'ablation totale de la Prostate," 'Gaz. méd. de Paris,' 1873.

4. Spanton, 'Lancet,' pt. 1, 1882, p. 1032 (myoma).

† Compare case thus operated on by Mr. C. Heath ('Pathol. Trans.,' vol. xxxix, 1888, p. 194).

voluntary but repeated ejection of a small amount of urine from the over-distended bladder. Both conditions may be tabulated thus :

The frequency of incapacity	Frequency at night nearly as bad as in day	Non-inflammatory contraction	Habit.	Obsolesced or advanced tubercle of the bladder.	Advanced interstitial cystitis following	<ul style="list-style-type: none"> Gonorrhœa. Stone. Enlarged prostate. Perimetritis.
The frequency of overflow	<ul style="list-style-type: none"> Age 30—45 ; onset first noticed in morning Age 45—70 ; onset first noticed at night 	Inflammatory contraction	Early spinal atony, <i>e.g.</i> tabes, advanced stricture.	Advanced atony of prostatic enlargement.		

The Frequency of Incapacity.

I am sure a very marked distinction, both for the purposes of prognosis and treatment, must be drawn between the bladder contracted by habit and that diminished by an inflammatory infiltration of its muco-muscular wall.

The contracted bladder of habit.—Dr. Braxton Hicks pointed out in 1868* that the constant evacuation of urine permitted by some mothers to their children allowed the bladder to become so constantly empty that the viscus became permanently contracted, and capable of containing only a very small amount of urine. Dr. Hicks laid down the principle that such bladders should be mechanically dilated by means of warm water, and reported two cases, one of the simple contraction, and another following cystitis, which he had thus treated. Since this date the mechanical dilatation of contracted bladder has been a recognised method, and in some instances it has been adopted with real benefit.

Dr. H. Marion Sims records two cases, in one of which† a young lady, aged 17, had been tormented over since she was two years old by constant desire to pass water and incon-

* 'Lancet,' "Mirror," July 4th, 1868.

† 'Brit. Med. Journ.,' pt. 2, 1052, 1889; 'American Journal of Obstetrics,' September, 1889.

tinence of urine at night. The pelvic organs were explored under anæsthesia, and the bladder was found to measure $2\frac{3}{4}$ inches from the meatus to the posterior wall. The mucous membrane lay in folds. Through neglect during infancy the capacity of the bladder had been thus reduced. The bladder was forcibly dilated by warm water thrown up by means of a Davidson's (very similar to a Higginson's) syringe, to which a silver catheter was attached. At the first sitting the bladder could not be made to hold over $1\frac{3}{4}$ ounces. The washing was continued daily, a little more water being thrown in each day. The process was painful, but the patient was courageous. At the end of two months' treatment the bladder could hold 12 ounces of water, and for the first time in her life she slept without wetting the bed. At the end of three months the bladder could hold 18 ounces. The patient was then cured, and has never had any return of her diuresis for eight years. In connection with the treatment, Dr. Sims sometimes had recourse to a mild faradic current applied directly to the neck of the bladder by means of a Simpson's sound connected with the battery.

In the second case, that of a woman aged 50, where chronic contraction of the vesical walls and diuresis followed old cystitis, a saturated solution of boracic acid or water was thrown up daily. At first the bladder could only retain an ounce of the solution; at the end of three months it could hold 22 ounces, and she could go for six hours without making water. The cure appeared to be permanent.

This form of treatment, which is admirable for the non-inflammatory types of contracted bladder, is hazardous for all those in which the contraction has resulted upon inflammatory infiltration; and in some cases where this condition is extreme the dilatation is, as I shall prove to you, very dangerous, and even liable to produce fatal results.

Inflammatory Contractions of the Bladder.

Obsolesced or advanced tuberculosis of the bladder.—Chronic primary vesical tuberculosis causes the gradual exfoliation of the mucous membrane of the bladder. The primary deposits of the mucous membrane coalesce and break down. The surface is stripped off little by little, until the entire sub-mucous tissue lies exposed and bare; the mucous membrane of the trigone in primary cases is usually the last to become detached. The inflammation which accompanies the slough-

ing process has, moreover, penetrated into the muscular coat (interstitial cystitis); and when these changes have taken place, an elastic, stiff-walled little reservoir of the capacity of three ounces remains. The patient is free from any pain. His stream is forcible, but thin and of short duration. His urine is often clear in the most marked cases of perfect obsolescence, but he is worried by the frequency of incapacity, being only able to retain a wineglassful or less at a time. Every half-hour by day the urine is passed. In the night the urine runs away without his knowing it, not in large quantities, but in dribblets of an ounce or two, and he clamours for some relief from the distressing frequency, the annoyance of the urinal, and the chafing of the abraded, urine-sodden genitals.

I can point to half a dozen cases in which this "cure" has taken place. I have also had post-mortems which have demonstrated this phase of the disease with exactness.* As your text-books are silent upon this subject, and as my experience of it has been, as you will see, painfully bought, I wish to draw your attention to the dangers of not recognising this stage, and of treating it injudiciously. When a young adult male or female applies to you for relief of a persistent frequency in the day, and an incontinence or equally distressing frequency at night, when all the symptoms of stone have appeared *coincidentally*, when by rectal palpation and suprapubic percussion you find no evidence of a large atonied bladder, and no symptoms of spinal degeneration are present, search diligently for deposit of tubercle in the kidney, testes, prostate, ovaries. Examine the perirectal tissue for enlarged glands. Learn if tubercular processes have been noticed in the family or in the patient previous to his or her urinary affection, and carefully eliminate tubercle before you sound, wash the bladder, or remove residual urine.

Young patients, the history of whose symptoms suggest past tuberculosis of the bladder, and who suffer from great frequency without residual, have probably contracted bladder, and need judicious treatment.

Dangers of Injudicious Treatment.

1. Some harm may be done by sounding or catheterism in the male, and by sounding or washing out the bladder in either sex. The quiescent tubercle, under the influence of

* 'Pathol. Trans.,' vol. xxxvii, p. 310.

the fresh irritation, may light up, and cystitis, cysto-pyelitis, or pyelo-nephritis supervene, and your patient be lost (Case 35).

2. The patient may lose all vesical capacity and become truly incontinent for life if cystotomy or urethral dilatation is performed (Case 67).

3. Great and irreparable harm, even fatal results, may ensue by attempting to over-distend the contracted bladder.

The well-known value of dilating, by means of hot water injection, bladders contracted by the concentric hypertrophy of habit suggests to the practitioner the use of the same method in every case of contracted bladder, but often the result is disastrous. There is no bladder so rigid, so inelastic, so intolerant of distension as the "cured" tubercular bladder. No muscle plane proves so friable as the stiffened fibro-muscular wall left by the disease in question. If you attempt to dilate such a bladder, expect hæmorrhage or cysto-pyelitis or subperitoneal rupture in the neighbourhood of the ureter. I have unwittingly ruptured two bladders, and I place the histories before you in order to impress you with the dangers attending such a line of treatment.

CASE 66. *Tuberculosis of the left kidney; impacted stone in the prostatic urethra; perineal section; subperitoneal rupture of the bladder; peritonitis; death.*—W. F—,* æt. 28, presented himself at the out-patient department of St. Peter's Hospital on February 22nd, 1890, complaining that he was unable to retain his urine for any length of time. His penis and prepuce were sodden with the constant dribbling of urine into an urinal. As he was suffering no pain I was inclined at first sight to diagnose the incontinence to be due to the atony of stricture. On passing a stricture-searcher I found it impinge against a stone at the neck of the bladder. I verified its presence with the sound. I obtained the following history from him:—"Five years ago he noticed his water became very thick, and he attended St. Bartholomew's Hospital for a while. Apparently he kept well until four months ago, when he fell downstairs. Soon after the accident his right testis began to swell, and his urine became very thick; blood was also seen in the urine; frequency of micturition increased, and now he is passing it every half-hour day and night, the water in addition to this sometimes escaping involuntarily. *He suffers no pain either before, after, or during urination.*" I had no suspicion from this history that he had a contracted bladder or a tubercular kidney. I looked upon the symptoms as pointing to advanced calculus.

February 26th.—I operated under ether. On holding the sound at right angles to the long axis of the urethra, I touched the stone easily at the neck of the bladder, but on depressing the handle and entering the beak of the instrument deeper, I was unable to feel any calculus in the cavity of the bladder. The same thing occurred with the lithotrite. My colleagues, Mr. Heycock and Mr. Reginald Harrison, met with the same experience. It suddenly struck me that I was dealing with an impacted prostatic stone,

* This case is recorded in 'Pathol. Trans.,' vol. xli, p. 191.

such as I had met with in another case ('Path. Trans.,' vol. xxxvii, p. 320). On passing the finger through a large patulous anus a stony hard prostate was encountered; the left lobe was the larger, but the lobular differentiation was confused. On pressure a crepitation was felt, and it was then certain that the prostate contained two or more stones embedded in its substance.

I therefore performed perineal section, and on introducing my forefinger into the prostatic urethra I came across the projecting nose of a sharp, irregular calculus. The nose was not large enough to block the passage, for a full-sized bougie, or sound or lithotrite could be swallowed by the canal with ease. By working my finger around the edge of the stone I was able to detach it from the surrounding adherent cyst-wall. I then got into the sac by degrees, peeling off the wall of the same cautiously as I went, and finally was able to remove the calculus by means of stout dressing forceps: the last pieces were detached from an extension of the sac which lay well beneath the trigone. On examining the bed from whence the calculi had been removed it was found that the entire prostate had been absorbed by pressure and replaced by the concretions. I washed the sac out well with a Higginson's syringe, the nurse working the bulb while I pointed the nozzle. Whilst she was doing this I noticed that the water did not run out of the wound at the same rate that it was pumped in, but I felt no uneasiness about it, for I considered that it was most probably overflowing the prostatic sac and entering the bladder. As I had previously proved the capacity of the bladder to be four ounces, the danger, which, as the sequel will show existed, of over-distending a bladder which had been unaccustomed for four months to hold much never occurred to me. The stones proved to be three in number; they articulated; the projecting nose of the one first felt was black with blood. They weighed together half an ounce.

As I had not interfered with the bladder in any way to my knowledge, I inserted no tube for drainage, thinking that the same would occlude the opening in the prostatic urethra, and that I should not get free drainage from the prostatic sac. I saw the patient in the evening of the same day. He had been vomiting, and had complained of much abdominal pain directly after awaking from the anaesthesia. There was a good deal of tenderness and swelling over the pubes. As he had passed no urine since the operation a catheter was introduced, but no urine was evacuated; temperature rose the same night to 101.8°.

Next morning (February 27th) he was still vomiting every hour or so, and could keep no nourishment down. No urine had come away, and none could be drawn off. The tongue was extremely dry, and the belly painful and swollen. The various remedies for suppression were exhibited, but without avail. He continued to vomit and to secrete practically no urine; the abdomen became tenser but less tender, hiccough set in, and he died exhausted on the second day after the operation.

The pain in the belly and the tenderness and swelling over the pubes of course pointed to pelvic cellulitis, but it was not until the post-mortem that I discovered the actual cause of death. I attributed all the symptoms to the splitting of the prostatic capsule by the over-distension of the washing out, and had no idea that that accident had happened, not to the prostatic sac, but to the bladder.

Autopsy.—Body well nourished; gut blurred, but no peritonitis of an adhesive nature except in the pelvis, where two coils in the deepest part of the recto-vesical pouch were glued together to the back of the bladder, and on pulling them away a little bloody fluid ran out of a little rent which

appeared there. The recto-vesical pouch was sponged free; it contained no fluid, but it was covered with adherent lymph. A large tubercular gland was found on the left iliac wall. The entire pelvic viscera were then carefully removed, the areolar attachment of the post-pubic tissues being dense and tough.

The bladder and urethra were laid open by an incision on the anterior wall and roof. On slitting up the prostatic urethra, the sac which had contained the stone was exposed, but it had not been ruptured. To my great astonishment, the cavity of the bladder was the size of a walnut; the mucous membrane was corrugated. With a little manipulation and stretching the capacity of the viscus was increased until it could have contained an egg. On the right side of the bladder and towards the base was seen an irregular rupture of the mucous-muscular wall, the length of which was a quarter of an inch. A probe passed readily through this into the enormously infiltrated subperitoneal tissues at the back and sides of the bladder. This extravasation into the tissue intervening between the mucous membrane of the bladder and the peritoneum covering its posterior surface was so great as to cause the bladder in the unopened condition to assume an appearance of moderate distension. Obviously the water which had been used to wash out the prostatic sac had escaped over the bladder neck into that viscus, had distended it, over-strained its contracted and inelastic disused muscles, then had finally split the mucous-muscular wall, and had extravasated into the subperitoneal tissues and percolated all round the bladder, and forced its way up to the right kidney. Both ureters were searched for, and were found much dilated and pyelitic, but the left was enormously distended, and in fact resembled a piece of small intestine. The right kidney was congested and inflamed.

The left kidney was small; the lower two thirds of the gland had been transformed into tubercular material, which was solid about the middle and ensacculated towards the lower end. The sacs were lined with lime phosphate, and contained much cheesy material. The rest of the body was healthy with the exception of a few calcareous nodules at the apices of the lungs.

You note—(1) It was not the mere removal of the calculus which caused death.

(2) That had the contraction of the bladder been realised previous to the operation the accident could have been avoided.

(3) That even a slight over-distension of a bladder rendered friable by the leanness of inactivity or by descending tuberculous change can rupture it subperitoneally.

(4) The incontinence was not remarkable, seeing that the entire prostate was taken up by a calculus, and the nose of the same projected into the urethra and kept the urethral orifice patent.

My second unfortunate experience is perhaps still more convincing. Here, again, I was quite unaware of the cause of the contracted bladder.

CASE 67.—Mary E—, æt. 29. This patient was without a family history of phthisis, but was imbued with a perfect dread of that disease from a pro-

longed attendance on her sister-in-law, who died of consumption. One day, seven years before death, whilst out walking, she was forced to retain her water over-long, and when the opportunity was afforded her of relieving herself, only a few drops could be passed. Great pain ensued, the urine became bloody, and all the symptoms of acute cystitis supervened, and continued for six months. She refused to see a doctor, getting each day worse, being quite unable to walk or even stand on account of the pain the erect position produced, though this was very much relieved by lying down. She had a constant desire to make water both night and day, the water being slimy, thick, and often bloody. After six months' trial of home medicine a doctor was summoned, who drew off some residual urine and apparently gave her balsams. She remained eighteen months more upon her back, "so slowly did the internal pain subside." During all that time she had a constant inclination to pass urine, the deposit in which after twenty-four hours was thick, slimy, and adhesive, and sometimes deeply coloured with blood. She so far recovered from that state as to be able to walk for miles without pain, which did not return unless she was over-fatigued, or took any diet of a stimulating nature, such as stout. The almost constant desire to pass urine continued up to six weeks before she came under my notice, with this additional feature, that she could only pass a few drops when she tried, but directly she stood up, it dropped from her without any effort or pain. Her surgeon now dilated the urethra to feel what was the matter with the bladder, whereupon the bladder contracted, the sphincter being *hors de combat*, and total incapacity and complete incontinence resulted.

When the patient came to me I examined *per vaginam*, and could feel the bladder through the septum to be of a heart or chestnut shape. It was the size of a large walnut. It contained no urine, but the little urine I collected as it ran out was clear. The legs and thighs of this unfortunate girl were raw with eczema, sodden with urine, and malodorous to the last degree. I passed a Jacques catheter, applied my left forefinger to the front of the vagina, and compressed the instrument as it lay in the urethra against the arch of the pubes. By this means I was able to inject a measured teaspoonful of boracic water, and as I did so the heart-shaped bladder *pressed down into the vagina*,—evidently I was only distending the base of the little bladder, and the muscular walls were rigid. Day by day, or every other day, I carried out the same treatment, injecting a few drops more each time, and shampooing the supra-pubic region with weak mercury and belladonna ointment, until in ten days the bladder held half an ounce, and the main muscular planes of the viscus had become perceptibly elongated. The patient could now pass a little water herself, and she was delighted. Emboldened by my success, I added air to my water, and put the bladder to a two-ounce pressure. I did not experience any sudden cessation of the counter-pressure, but the patient suddenly called out that she had an intense pain *at the left iliac spine*. It passed off in a couple of minutes. I asked myself, Had I burst the bladder? and I replied in the negative: (1) because the air and water returned with a rush; (2) because she passed half an ounce herself before she left the room; (3) because no blood appeared.

The next day the patient complained of slight chilliness. On the third day after, the temperature, which previously had been slightly raised, went up to 101° and then to 103°. Crepitations were heard at the base of the left lung. No rust-coloured sputa. As she complained of her right renal region I examined that region, and found an enlarged, hard, and moveable right kidney. Moreover on searching the bladder through the vagina I found large softish glands in chains in the perivesical and pre-rectal tissue, such

as I usually consider indicative of pelvic tuberculosis or carcinoma. From this day the case assumed a different aspect in my mind. I did nothing further to the bladder, contenting myself merely with washing it out every day. It was now a toneless sac, containing half an ounce of stinking residual urine.

Seven weeks after my last dilatation she complained of supra-pubic tenderness, and on palpating this region I found a distinct swelling on the right side of the bladder, which I diagnosed as a pre-vesical abscess; but as her temperature was now normal, and as also at her next visit two days after this swelling had disappeared, and the pain in that region was no longer felt, I concluded it was a transient pericystitis. The patient now grew alarmed at the constant appearance of blood on her linen, believing she was continually menstruating. The hæmorrhage, though never excessive, came from the bladder. The tongue was always a little furred, though the temperature kept normal, and I proposed sending her back to her home in the country. One day she caught a severe chill whilst shopping in snowy weather: her temperature rose and she vomited. I was summoned next day to see her, and found the temperature 104° . In four days she died, apparently of exhaustion, for the sickness never ceased. Her mind was clear to the last. I obtained leave to make the autopsy.

Post-mortem examination.—A layer of fat half an inch thick on abdominal wall. Stomach and intestines contracted and empty. The omentum was spread out like a shawl over the latter, being adherent by its lower margin to the back of the pubes and to the lines of Poupart's ligament. This adherence was made more manifest by cutting across the omentum and throwing the lower half on to the thighs. It was then seen that its lower margin was attached to the peritoneal back of a small extra-peritoneal extravasation of urine. The pelvic viscera were removed entire; it was noticed how extremely tough were the adhesions between the posterior surface of the pubes and rami, and the contracted bladder. On opening the bladder it was seen that it was destitute of mucous membrane. The internal surface was dark black in patches from extravasation of blood. On the right lower lateral wall was a small crack in the muscular coat, which led into the extra-peritoneal sac mentioned above. This sac held about three ounces of puriform urine; its walls were thick, its internal surface sloughy; it was situated on the right side of the bladder, behind the pubic crest and right ascending ramus of the pubes.

The right ureteral orifice gaped widely and admitted the little finger. It discharged pus on slight pressure being made on the ureteral canal. The right ureter was extremely dilated in its whole length, but its walls were also thickened with tubercular material. The right kidney was a mere loculated sac filled with cheesy material. The left ureter was healthy. The left kidney was large, and had evidently done duty for some time. Long streaks of pus radiated from the hilum to the cortex. No visible abscesses.

There was no peritonitis, either acute or chronic, beyond that localised inflammation which caused the adhesion of the omentum and gut loop to the back of the sac. The intestines were lifted out of a dry pelvis, and showed no trace of adhesion between their coils. On gently separating the uterus from the adherent bladder the posterior wall of the latter tore like rotten linen. The entire upper surface of the liver was strongly adherent to the diaphragm by tough adhesions. There was a patch of recent pleuritic adhesion on the upper surface diaphragm at the base of the left lung. The left apex was puckered and calcareous. There was no broncho-pneumonia or any other signs of thoracic disease.

I will give you the conclusions I arrived at on finishing the post-mortem.

1. The incontinence was nature's cure of a tubercular bladder, and nature's drain to a diseased tubercular renal sac; and the disease was in the quiescent stage when the patient came under my care. It had burnt itself out, leaving some renal tinder behind.

2. The perirectal glands and both kidneys ought to have been carefully examined before any steps were taken to treat the bladder, though I question if the vaginal glands were enlarged before treatment.

3. Clear urine does not exclude a diseased, useless, and dangerous caseated kidney. It was probably derived from the healthy left gland, the right (volcano-like) being inactive.

4. The sudden stitch at the left iliac spine (why left?) denoted the muscular rupture on the right of the bladder.

5. The transient pericystitis was the advancing flush of inflammation which travelled upwards from an extra-peritoneal collection of pus and urine low down in the right side of the bladder.

6. The indication for the next case is to adapt a good urinal and leave well alone.

I need hardly say that since this untoward experience I have followed out my plan of leaving fully contracted tubercular bladders alone, and have not had cause to regret it. I have watched a fair number pass through the stages step by step until they reached this condition, and have controlled my knowledge of the pathology by means of the cystoscope; and I unhesitatingly advise you to modify by drugs the acidity of the urine, but to beware of meddling with the contracted bladder itself.

The Contraction following Interstitial Cystitis.

Similar contraction of the bladder results from disease aided by prolonged drainage, in incontinence after perineal lithotomy in boys, and in many forms of interstitial cystitis—for example, that due to calculus, stricture, perimetritis, &c. Never, I believe, does the diminution in the capacity proceed to the same extent as that consequent upon tubercular disease. In extreme cases the interstitial cystitis may so far contract the bladder that it is only able to hold two or three ounces. The patients who have reached this stage are in a miserable plight; not only have they a "fixed

time," from half an hour to an hour, beyond which they cannot go without passing water, but they are also often attacked by transient bouts of even greater frequency. Here is a case in point apparently following pregnancy.

CASE 68.—Mrs. C—, æt. 37, was sent to me by Dr. J. Tuxford, of Boston, for a distressing frequency of micturition. The patient, who wore a urinal, stated that three years ago, seven weeks after her last confinement, she was suddenly seized by a frequent desire to pass water, the call being every half-hour day and night. The irritability was *painless*. There was no influenza, no trouble with the confinement to account for this attack; the family history was good in every respect. After six months' irritability [small pieces of blood appeared in the urine, and a year ago "she had a profuse hæmaturia, the urine being as scarlet as the blood from a cut finger." At the next urination clots were passed, and the water became clear. Shortly after this there was a similar attack, which subsided in a similar fashion. After this she began to pass white gravel, the pieces usually being the size of half a pea. She has been under the care of a London gynecologist. For the last three months, and only for that period, she has suffered pain after micturition in the meatus. She has not lost flesh. My notes of her are as follows:

Present condition.—Body well nourished, face not anxious, a very self-possessed, strong-minded woman. Frequency every half-hour in the day and every hour at night. Complete control over the urine, but the call is imperious. The patient is subject to bouts of frequency. Thus she is sometimes forced to pass water every three minutes for a whole hour, and usually sits on the commode during the attack. After the hour has passed she will be better and lapse into her usual irritability for the rest of the twenty-four hours. She cannot tell what induces these attacks; they take place at any hour in the day or night, usually they are in the morning.

Examination.—Uterus mobile, os very patulous, no cervical erosion. Bladder fixed to uterus. I experienced considerable difficulty in washing out the bladder; only an ounce can be retained. On introducing the cystoscope I saw what I took to be a white tuft of phosphatic-encrusted growth (?) on the posterior wall, behind the interureteral bar. I wrote to Dr. Tuxford, advising a careful examination under ether, because of the contracted bladder, and a removal of the growth if it was found to be fibropapillomatous. The patient was anæsthetised, and to my surprise I could not find the growth anywhere. What I saw was this: a small bladder (ounce and a half capacity) lined with mucous membrane. Its shape was most irregular; it was a series of five or six pouches or bulgings; the partitions between these bulgings (? scars of ulcerations) stood out dense and white in the distended condition of the bladder, and their colour threw into greater contrast the purple swollen mucous membrane of the adjoining pouches. On the posterior wall of the bladder, running vertically, was a very thick and puckered partition. About its middle was an eaten-out irregular ulcer with floating filamentous slough attached to it. The base of this ulcer was powdered with glistening white phosphate of lime. This partition edge looked like the keloid of the scar of a burn breaking down. Here, then, was the source of my error; in the half-distended state I had seen this phosphatic sloughy ulcer pushed forward into a conical mass by the folds of succulent mucous membrane of the two adjacent pouches. This ulcer also was the manufacturer of the little pea-sized pieces of phosphatic grit. Was there any in the bladder? I could see none. Just as I was withdrawing the

cystoscope from the bladder I caught sight of a large pea-sized irregular calculus imbedded in a ledge of a *transverse* fold of succulent mucous membrane of the anterior wall immediately above the urethra.

I was greatly puzzled as to what to do for this lady. If I dilated her urethra to scrape the ulcer and remove this embedded piece of grit I should probably produce a lasting incontinence. If I did supra-pubic cystotomy I should find the peritoneum very adherent to the back of the bladder and pubes and the viscus lying deep in the pelvis. A vaginal cystotomy would perhaps never heal, for there was very little vesical muscle left to do the work as it was, and an opening would probably cripple it permanently.

The immediate result of the examination was to cause the patient to micturate forty times in the first three hours; she then relapsed to her normal time of every half-hour.

I determined to scrape the ulcer with a fine curette under the action of the light, both instruments being in the urethra at once, but I failed. I then used a larger scraper introduced through the urethra, and directed it on to the spot, and succeeded. Little by little she improved until her frequency was two hours in the day and three hours at night. The improvement was maintained for six weeks or two months, but the irritability then returned, and with it the calculous formations. How to get rid of this chronic ulcer of cicatricial tissue I could not tell. Improvement always resulted from scraping, and I did this six times in twelve mouths, each time the edge of the septum getting thinner. Finally, after my last scraping I gave her a specially curved double catheter, the entering eye of which could be so directed as to throw a stream of water directly upon the ulcer. Since then I have seen no more of my patient, and I hear from time to time that the improvement is maintained.

Treatment of the Frequency of the Contracted Bladder.

Sufficient has been said in the foregoing cases to indicate that the non-inflammatory forms are benefited by careful systematic distension with warm water, but that in the inflammatory types greater care is needed, and much dilatation had better not be resorted to. Washing with boroglyceride solution or even warm water, and the prevention of phosphatic concretions will produce the best results obtainable. The usual remedies for cystitis may perhaps be of benefit, but the main point is to render the urine as little irritating as possible.

The Frequency of Overflow.

This is the direct opposite condition to that which we have just been discussing; instead of a contracted bladder we have a largely distended bladder, the muscle-walls are atonied and cannot expel the contents, the urethral orifice becomes more and more dilated, every few drachms collecting over and above the residuum force the weakened barrier at the neck; the desire to urinate is thus evoked, and the small

surplus is expelled. At night the urine runs over in the same fashion, but the call does not awaken the patient, and he finds in the morning his night-dress and bedclothes wet with the escaped urine.

I have said before (p. 167) that the onset bladder symptom of chronic spinal cord disease is usually nocturnal incontinence, less seldom is it frequency, and very seldom indeed is it retention. A glance at the table of twenty cases of spinal atony (Lecture on Incontinence of Urine) will corroborate this statement.

Frequency as a herald to the incontinence is sometimes met with in true locomotor ataxia (tabes dorsalis) in those patients in whom the knee-jerks are absent, the inco-ordination of gait is marked, and the pupils are characteristic. Those patients with excessive knee-jerks and no pupil changes (chronic myelitis) usually notice incontinence first.

The treatment is the same as in other extensive atonies—catheterisation. The dangers of reaction are not nearly so great as in prostatic atony (p. 178); but resentment to the introduction to catheter life does exist, and should be met on the lines I have already laid down.

SYNOPSIS.

A. *The Frequency of Quantity.*

(*Much urine, which is passed often.*)

Persistent excess	{	High s.g.	Sugar	Diabetes mellitus 95.	
		{	No sugar, but extreme thirst	{	Diabetes insipidus 95.
			Albumen with casts, but without pus or residual urine		
Transient excess (usually diurnal)	{	Low s.g., clear	No albumen, but with residual urine			{	Back renal pressure from prostatic atony or direct renal irritation of prostatic origin 96.
			(a) Sexual excess or debility (without inflammation). Dietetic idiosyncrasy—tea, beer, &c.		
			(b) Hypochondriasis, hysteria, nervousness.		

B. *The Frequency of Irritability.**(Little water, which is passed often.)*

1. Without obstruction to the stream	(a) Without pus	{ Blood, lithiasis, phosphaturia, oxaluria, dyspepsia, 97.
	(b) With pus	{ Various irritants in renal pelvis and ureter, <i>e.g.</i> stone, 100; tubercle, 108. Movable kidney. Cystitis of all grades, 120. Catarrhal or tubercular ulceration of the bladder, 125. Hard cancer.
	(c) With prostatic threads of pus	{ Micturition reflex excited by transient inflammation or congestion of the prostatic mucous membrane, <i>e.g.</i> gout, 141; catarrhal prostatitis, 143. Masturbation, 150; prostatic tubercle and stone.
2. With obstruction to the stream	Diurnal	{ Stone; stricture, 155 (6 F. gauge); prostatitis, 161; muscular atony of low degree, 166; vascular growths of female urethra, 167.
	Nocturnal	{ Enlarged and congested prostate without much residual, 168.
	Diurnal and nocturnal	{ Enlarged prostate with residual, 169. Cancer of prostate, 189.

c. *Physical Irritability.*

The frequency of incapacity	{ Frequency at night nearly as bad as in day	Non-inflammatory conditions	{ Contraction due to habit, 197.
		Inflammatory conditions	{ Contraction due to obsolete or advanced tubercle of the bladder, 198; to advanced interstitial cystitis following gonorrhœa, stone, enlarged prostate, perimetritis, 205.
The frequency of overflow	Age 30—45	Spinal atony (tabes), 207; advanced stricture, 207.	
	Age 45—70	Advanced atony of prostatic enlargement, 207.	

SECTION VII.

THE PAIN AND REFLEX NEUROSES OF URINARY DISEASE—THE AMOUNT AND CHARACTER OF THE PAIN—"REFERRED" PAIN—THE LOCALITIES WHERE THE PAIN IS EXPERIENCED—THE REFLEX NEUROSES INDUCED BY THE PAIN OR IRRITATION.

It might be thought that a special consideration of the amount, the character, and the reflex results of the suffering attendant upon urinary disease would not only involve fruitless, but also limitless labour. The task would seem fruitless because there is no uniform relation between the intensity of pain and the severity and danger of the disease;* limitless because there is no pain, with the possible exception of that due to stone, which can be considered as characteristic in its nature or position of any single urinary complaint. Moreover, in the study of comparative pain, we must always encounter serious difficulties. Men differ very widely in their perception of pain.† All are not equally affected by it. That which might be held as trifling by one man would be considered as agony by another endued with a more highly strung sensitive nature. Again, men vary greatly, according to their education and habits of observation, in their power of describing the character of their suffering, and in localising its exact position. Women are especially vague as regards the locality of bladder pain, partly from feelings of delicacy,

* Sieveking, 'British Medical Journal,' 1867, part i, 131.

† Compare a case of courage or insensibility to pain during double amputation of the legs for conical stumps without chloroform ('Guy's Hospital Reports,' vol. xxviii, p. 143, 3 ser., 1886).

The Irish are said to feel pain more acutely than the Scotch, and Latin races are more sensitive to suffering than Teutonic. I believe those individuals of neuralgic temperaments feel pain intensely.

W. Collier ("The Comparative Insensibility of Animals to Pain," 'Nineteenth Century,' October, 1889, p. 623) says, "A correspondent to the 'Spectator' related the fact that on the introduction of boots into New Zealand the vanity of the natives was so great that, when one of them was happy enough to become the possessor of a pair, and found that they were too small, he would not hesitate to chop off a toe or two, staunch the bleeding by covering the stump with a little hemp, and then force the feet into the boots."

and partly from a confused knowledge of vulvar anatomy. With all these sources of fallacy, and with the admission that the subject is somewhat barren, and that the symptom pain, if estimated upon its own merits, has but little diagnostic value, it is still essential for the following reasons that we should elevate its rank for to-day, and give some of its phases our close attention. Many will not consult us until absolutely forced to do so by the pain they are suffering. Many, again, gauge our skill and knowledge by our power of relieving pain. Moreover the locality of the pain often serves as a guide to the site of the disease, and the manner in which it is described by the patient is often an index to his susceptibility. But more than this. Amongst other unpleasant sequelæ of the late epidemics of Russian influenza may be counted an obstinate and severe neuralgia of the lower urinary organs. It is doubtless of a purely septic character, but it is most misleading in its clinical aspect, and I have more than once been tempted to suspect that carcinoma of the hard variety was forming, when in reality the local and referred pains were merely the direct result of a severe attack of *la grippe* in a patient of rheumatic or gouty stock or tendencies. It will be wise, then, to glance briefly at the subject; and it will be convenient to divide it into three parts: the amount and character of the pain, the locality of the pain, and the reflex neuroses induced by the pain.

(a) *The Amount and Character of the Pain.*

Of the actual amount of suffering usually evoked by the various urinary diseases we can say but little. Of the three sections of the tract—the secreting, conducting, and collecting portions—the bladder possesses without doubt the greatest sensitiveness as well as the greatest capacity for the exhibition of its resentment to irritation. It is true that the pain of the passage of the ureter by a sharp-edged calculus can transcend in acuteness any other agony of urinary origin, but such attacks are usually short-lived, and the sufferer has time to recoup before another prostrates him. But in bladder disease—for instance, in stone with co-existing cystitis, or in sudden unrelieved urethral obstruction*—the vesical muscles

* CASE 69.—I have never seen such maddening agony as occurred in a young serofulous subject, æt. 18, in whom the prostatic urethra was suddenly corked by a large phosphatic encrusted slough. This mass, partly adherent to the wall of the bladder and partly free, had floated into the orifice, and had thus produced a sudden and unaccountable retention. The screams of this

are much larger and heavier as compared with those of the ureter, and are thus able to cause much greater suffering in their futile and frantic spasmodic efforts to relieve the viscus of its source of irritation. The mucous membrane also is of much greater expanse, and therefore the area of the perception of pain is proportionately larger, whilst it is certain that that which covers the neck of the bladder is more sensitive than that clothing the pelvis of the kidney.

Kidney.

Taking the various parts of the tract in their order from above downwards, it may be said of the kidney that if the capsule be not *suddenly* put upon the stretch, the secreting tissue may be gradually destroyed without any noticeable pain.* Cancer, tubercle of the renal substance, stone embedded in the cortex, even the removal of the body of the gland by gradual backward pressure, may all be far advanced without the patient realising that a progressive disease has attacked him. In fact, the malady in some cases may be unsuspected until the autopsy reveals its existence.

Cancer of the kidney.—As a rule, unless “clot” or “growth” colic supervenes, cancer of the kidney produces but little if any pain until the later stages, and then it is rarely severe.

Pain is, however, experienced if the growth be very rapid, if calculus pre-exist in the pelvis, or if swelling from nephritis ensue. In two cases I have known great pain produced by septic inflammation of the carcinomatous kidney. In both cases I believe that the cause of the pain was the sudden tension upon the capsule (Cases 27 and 28).

The following case is reported by Brodeur† as occurring in the practice of Dr. Reliquet, and it serves to illustrate the

patient resounded through the hospital in a manner never to be forgotten. The slough was removed with the lithotrite, and with the immediate cessation of all the symptoms.

* Mr. Cartwright (*Lancet*, 1880, vol. i, p. 403) reports the following:—“Some years ago, when in the Yang Tse River in China, he was shown by the doctor of an American vessel, also lying at anchor there, a specimen of a kidney. It had protruded from a wound in the loin, and had been dressed, according to Chinese fashion, with a mixture of bird’s dung, saliva, &c., and when the man was seen by the doctor the organ was in a state of putrefaction. Mr. Cartwright’s acquaintance thereupon removed the mass, after which the patient, who had simply taken a pipe of opium during and after the operation, disappeared. He returned, however, in two or three weeks’ time, and, as showing his appreciation of the services rendered him, brought with him another man suffering from cancer of the tongue.”

† Brodeur, *‘Affections du rein,’* p. 147, 1886.

cause of the pain as well as beneficial results obtained by relieving the tension.

M. X—, æt. 50, consulted M. Reliquet in December, 1884, for urinary trouble. His history was as follows:—For many years he had suffered from nephritic colic accompanied by hæmaturia, and had voided uric acid gravel. After passing in 1881 a larger piece of calculus than usual, he remained well until October, 1884, when he again had an attack of nephritic colic. Towards the 20th of October of the latter year, fever, rigors, headache, anorexia, and frequent micturition appeared. The urine was malodorous, muco-purulent, but abundant. No renal tumour of the left side, where pain was complained of, could be felt at this time, but in the early part of December a tumour the size of a large apple was discovered in this region. It was painful on pressure, slightly moveable, and it was considered to be a hydro-nephrosis by the medical attendant.

He now consulted M. Reliquet, who found a left renal tumour the size of an infant's head, without bosses or soft points. The urine was scanty, murky with purulent deposit, ammoniacal, and very fetid. There was extreme irritability of the bladder; a few drops of urine could only be voided at a time, much suffering being experienced both before and after the act. The patient demanded to be released from the excessive and recurrent pain of nephritic colic and strangury. M. Reliquet, believing that he would not live much longer in such extreme suffering, performed lumbar nephrotomy by means of the thermo-cautery. When the renal tumour was laid bare it was punctured with the thermo-cautery, and on withdrawing the point a jet of blood shot out from the opening with so much force that it passed over the operator's shoulder. The finger was inserted through the hole thus made into the kidney, and it was then found that the tumour was extremely soft and friable, so much so that when an attempt was made to enucleate the gland it broke down under the fingers in all directions, and the operator, after tearing away as much as possible of the renal mass, arrested the profuse hæmorrhage by means of sponges packed into the wound. The patient was immediately relieved of all pain, the vesical irritability subsided, the nephritic colic ceased, the urine augmented in quantity, neither nausea nor vomiting reappeared, the patient was able to take food with comfort, and he pronounced himself "*cured*." In spite, however, of this remarkable result of the operation the growth progressed, and the patient died two months afterwards.

Tubercle of the kidney.—Tubercle may transform the entire gland into a putty-like mass or into a puriform sac, and evoke only a constant wearing pain in the loin. This fact is illustrated by some of the cases of renal tubercle I have already quoted (Cases 66 and 67).

Sudden tension on capsule.—Any sudden tension on the capsule of the kidney, such as is brought about by congestion, inflammation, or sudden back pressure from the ureter, bladder, or urethra, provokes a more or less dull, heavy pain across the lower lumbar vertebræ.

Pelvis and calyces.—In diseases of the pelvis and ureter, sheathed as these conducting tubes are with sensitive mucous

membrane, the matter is far otherwise. A calculus, loose in the pelvis, is able to induce pain which varies in intensity according to the character of the surface of the stone* and the grade of the co-existing pyelitis, from a dull aching to extreme paroxysmal pain. But if there is no mucous membrane, or no inflammation, the entire pelvis may be filled with stones, or with a branched stone, without any symptoms being present. A good example of this is recorded by Hunter. A stone weighing seven ounces and a half, the shape and size of a kidney—"was taken from the pelvis of the right kidney of Mrs. —, a natural daughter of Sir Richard Steele. She was never known to have a nephritic symptom till just before her death, when she was taken with a violent pain in her right side near the back, the seat of the right kidney, which appears to have thrown her into a fever, of which she died. Upon opening the body was found this stone falling upon an enlarged pelvis, and the substance of the kidney itself had become so thin as only to appear like a coat or membrane covering the stone, which gave the idea to the surgeon that the substance of the kidney was grown into a stone."

I have never met with tubercular disease of the pelvis in which the pain was really excessive, unless there was some obstructive caking of the ureter, and the pain of the consequent colic was superadded; but Mr. Thornton† reports a case which perhaps may be an example of pure pelvic tubercle causing pain. All the symptoms were those of calculus—pain over the kidney and down the ureter, with attacks of colic then hæmorrhages, and finally profuse suppuration and enlargement of the kidney. The patient was a stout, rosy woman, so much so that Mr. Thornton would have doubted her statements had he not actually seen her in great agony. When the pelvis of the kidney was opened, its lining membrane was found covered with little seed-like tubercles; there was no stone. The patient was immediately relieved of all

* Prout ('Urinary Diseases,' p. 325) states, and various writers have copied and endorsed his remarks, that "lithic acid conerctions produce the least pain, and that this is often dull and oppressive with a sense of weight." Oxalate of lime often produces great pain, which is principally referred to a particular spot over the region of the kidney, but is often discursive, and shoots in the direction of the ureter, epigastrium, or shoulder. Conerctions of phosphates are sometimes attended by great suffering, which is almost unremitting, but which is apt at intervals to assume an aggravated form, so that the affection becomes paroxysmal. This form is sometimes accompanied by a distressing sense of burning heat in the back.

† 'Surgery of the Kidneys,' p. 47.

her symptoms, but the fistula persisted and the other kidney became affected. She died of uræmia seven months after the operation. The post-mortem revealed extensive tuberculosis of the kidney operated upon, and of the rest of the urinary organs.

Hydronephrosis.—If there is no complete and sudden obstruction to the ureter, hydronephrosis does not as a rule cause any suffering. Any sudden closure of the outlet by swelling or foreign body can evoke suffering amounting to the most severe torture. Mr. Morris* describes the condition of one of his patients thus. He says, "I found him clad only in his nightshirt, lying on the floor of his room, writhing and perspiring and crying out with the agonising pain in his belly. So violent was the pain at the time of my visit, so incessant the writhings, so large the tumour, and so imminent seemed to be its rupture, that I resolved on cutting down upon the kidney through the loin with such instruments as a pocket case contained."

Ureter.

Of all the suffering that man is heir to, renal colic is perhaps the worst. The pain is induced by the engagement of the mouth of the ureter, or by the passage along that canal of a stone, blood-clot, scrofulous slough, débris plug, collection of clumpy muco-pus, or hydatid sac. I have watched all these varieties, and I do not doubt you have seen instances of all, with the possible exception of hydatid sac colic, which I will illustrate directly. Probably these foreign bodies stand in their power of evoking agony in the order in which I have placed them. The agony of renal colic is so great that men have committed suicide, women have aborted,* and syncope, convulsions, and epileptic fits have ensued. Oxalate of lime stones are supposed to cause the greatest pain, and uratic stones the least. It is obvious, however, that the wider and more accustomed the ureter becomes, the more the pain of the transit, *cæteris paribus*, will diminish. The renal colic is not merely due to the actual passage of the foreign body, but also to the damming up of the secretion behind it.†

* Morris, 'Surgery of the Kidney,' p. 458.

† In one case under my notice, in which the stone was impacted at the pelvic brim, all the symptoms subsided on removing the kidney and leaving the stone.

CASE 70. *Example of renal hydatid with hydatid sac colic.*—I have selected this patient* from the three cases lately in my wards because he has been passing hydatid sacs for thirty years, and can supply us not only with a history of the colics, but also with a large and good specimen of the sacs he evacuates. Thirty-one years ago he had an attack of left renal colic, and passed a small grape-like body. These attacks have continued ever since, usually taking place three or four times a year, though once or twice a whole year has elapsed without such an occurrence. At first the cysts were smaller, so that he did not notice them, but they have gradually increased in size, and the colic has become correspondingly more severe. The cysts up to a year ago used often to come away singly, or two or three at a time; latterly they have so increased as to be innumerable. His account of the usual character of these attacks is worth recording.

“The left testicle gradually becomes numbed, then painful, until the agony is unbearable. Then the left kidney commences to ache, causing me to ram my fist into it. The pain in the left testicle subsides as the agony in the left kidney increases. Then I feel a dart or two—perhaps only one dart—at the peville meatus. I know then that the cysts have entered the ureter; there is no pain along the track of the ureter, but the kidney pain becomes awful, and I roll over and over on the floor or on the bed, or dash about the room. Suddenly all pain ceases, and I know that they have reached the bladder. I now pass the cysts without pain in the urethra. Fifteen years ago there was always a little blood with the water when the pain was gone; the attack lasts eight or nine hours. Sometimes the cysts are passed singly, and then I have only slight pain in the kidney, and even when I am talking to people I may feel them drop into the bladder. This kind are a little larger than peas. If they collect, then they cause the colics.” During the last year he has passed more than all he has evacuated during the thirty years of his illness, and the attacks have taken place every two or three weeks. Latterly, within a month of his consulting me, the character of the urine has changed; “instead of being clear with pellucid bodies or grape-skins, it has become like thin gruel.”

Present condition, September 17th, 1889.—Patient comes suffering from the effects of a recent attack; he is pinched and white, tongue is very foul, pulse is weak, and the surface of the body is cold. His urine contains much pus besides the broken and entire cysts. It is decomposing (the fresh urine was subsequently found to contain triple phosphates, pus, bacteria, uric acid crystals). There is a foetal head-sized tumour in position of the left kidney. It feels extremely hard and inelastic. No hydatid fremitus, but it is tender on pressure; it is evident that the sac is suppurating. I offered to drain the sac, but the patient objected. He was placed on alkalis. Gradually the urine cleared, the pain ceased, and the attacks of renal colic became more and more rare. The sac has also contracted, until it is now comparatively small.

He now thinks he is “cured.” Perhaps he is, but not by any treatment I have given him.

The subjective phenomena of renal colic also arise in constrictions or twists of the ureter, or in scrofulous narrowing of that canal.

* This patient was also shown at the Clinical Society (‘Clin. Trans.’ vol. xxiv, 1891, p. 240).

A good example of the truth of this statement occurred in our wards not long ago.

CASE 71.—A man æt. 46, who had had fortnightly attacks of severe renal colic for two years, and constant pain and irritability of the bladder, was sent up to me for examination. The diagnosis made was that the left kidney was a mere sac of strumous material, that the corresponding ureter was thickened and obstructed, and that probably a small free uro-phosphatic stone co-existed. I lost sight of the patient, and ultimately found him under the care of a colleague. Supra-pubic cystotomy had been performed in order to scrape a supposed bladder ulceration. On post-mortem the bladder was found healthy, but the left kidney was a thin-walled sac of scrofulous material, so intimately adherent to the descending colon that it was quite impossible to dissect it off. On cutting into the sac only a thin layer of renal tissue was found left. The ureter was of great thickness, and in feel resembled a giant *vas deferens*. Its channel was abruptly narrowed at its junction with the pelvis, and the only remains of the rest of the tube was a fine zigzag canal blocked here and there by plugs of curdy slough. No stone was found in the renal sac.

Bladder.

If we omit the extreme pain of muscular spasm, the intensity of pain in bladder disease is in direct proportion to the grade of the co-existing inflammation. It is important to remember this, for the pain in vesical disease is intermittent in severity, and ebbs and flows with the tides of cystitis. Bladder pain is usually studied in relation to exercise, micturition, and to the sudden or gradual manner in which it makes its appearance; but of this more hereafter, when we consider the localities of pain.

Stone in the bladder.—The pain of stone in the bladder is most variable. In the insensitive bladder of the aged, or in those with pouches or depressions behind the prostate which receive and retain the stone, all pain may be absent, and the stone may lie latent. In the adult some hardly suffer at all, others so severely that they will risk anything to be freed from their agony. Thus a blacksmith at Amsterdam and a cooper at Königsberg are reported to have performed self-lithotomy.† Very large stones evoke but little pain. Thus one of my patients from whom my late colleague, Mr.

* Morris, 'Renal Surgery,' p. 312.

† Alf. Poland, 'Holmes' System of Surgery,' vol. iv, 1884, 2nd ed. This and self-Cæsarean section are, I believe, the only two major operations which have been performed by patients to rid themselves of intolerable agony. (Cf. Harris, "Six Self-performed Cæsarean Sections," 'Intern. Journ. Medical Sciences,' vol. xcv, 1888, p. 153.)

Rivington, removed a stone supra-pubically weighing a pound and a half ($23\frac{1}{2}$ ounces), complained more of the difficulty of urination than of pain; and Mr. Thomas Smith removed a stone supra-pubically which weighed $20\frac{1}{2}$ ounces, and measured $11\frac{1}{2}$ by $9\frac{1}{2}$ inches. The patient had had very little inconvenience. He was a soldier, and had only been invalided ten weeks. As a general rule phosphatic stones cause more suffering than smooth uratic calculi.

Encysted stone.—I believe in many cases the pain of a perfectly encysted stone is due to co-existing inflammation in and around the mouth of the sac and of the adjacent mucous membrane of the bladder. I am watching this patient, who has an encysted bladder calculus, with great interest. The neck of the stone can be seen with the cystoscope, and the body can be distinctly felt *per rectum* as a hard body embedded in the posterior wall of the bladder. As he has no inconvenience he naturally postpones all operative interference.

CASE 72.—A. P—, æt. 28. Three years ago, being then in perfect health, and never having had any urinary disease or trouble, he jumped off an omnibus whilst it was in motion, and came with an unexpectedly sudden jerk upon his feet. He immediately felt a severe pain in the crutch, but by putting his finger into the perinæum and pressing upwards he gained relief enough to walk home. The pain continuing, his doctor sent him to a London hospital, and the surgeon, under whose care he was admitted, skilfully crushed a calculus weighing 368 grains.

Fourteen days after the operation he began to be troubled with renal colic, and since then he has had repeated attacks. The attacks are very short in duration, and occur once a day. Pain, not apparently of a severe character, starts in the left kidney, and courses along the ureter to the testicle, which is drawn up.

On examining the prostate I found the greater part of the interlobar line had gone, and my finger felt as though it would plunge through the thin prostatic capsule into the prostatic urethra. I could feel the posterior surface of the pubes easily, and I had no doubt that a calculus had become encysted in the prostate, and the sudden jerk he had sustained in leaping from the omnibus had wrenched it from its bed and had thrown it out into the cavity of the bladder. I could see a deep prostatic pit with the urethroscope, and was confirmed in my opinion. I was, however, quite unprepared for what the cystoscopic examination demonstrated.

Cystoscopy.—In order to ascertain the condition of the left ureter preparatory to performing nephrolithotomy, I introduced the electric cystoscope, and found the entire surface of the bladder in a state of subacute cystitis. After thorough washing "I saw something which puzzled me greatly. Protruding and retracting from a small hole in the left side of the bladder above the left ureteral orifice was a brown spike. I noticed it moved with respiration. It looked like the beak of a sand-martin projecting from the hole leading to its nest in the sand-bank or cliff. At

first I felt certain it was a stone sticking in the mouth of the ureter, and this impaction explained the presence of renal colic and the absence of bladder symptoms. On introducing my finger into the rectum and examining the posterior surface of the bladder, I felt, high up on the left side, a stony hard body in a sac, and knew at once the spike I had been looking at was the nose of the encysted stone."*

The curious part of the case is yet to come. From the date of this cystoscopy and the thorough vesical irrigation, the patient has been absolutely free from all symptoms of renal colic. He alleges himself to be cured. He reports himself to me every month or so, and I do not fail to examine this encysted stone through the rectum. I am inclined to believe its weight had pressed upon and slightly occluded the left ureteral orifice, the narrowing being increased by the swelling of the subacute cystitis, and that washing and sandal oil by removing the latter has removed the partial obstruction; anyway, this encysted stone is now symptomless.

Carcinoma of the bladder.—It is a mistake usually committed by a tyro to consider carcinoma of the bladder as necessarily and always productive of more terrible suffering than any other vesical disease, and to suspect cancer in all cases in which the pain is excessive and continuous. A large proportion of cases of malignant disease are of the softer variety, and as such do not cause much if any pain until cystitis has supervened, or until their bulk obstructs the urethral orifice or reflexly excites the vesical muscles. With the harder but rarer forms of growth which infiltrate the wall, the pain appears rapidly, is increased quickly by the irritative cystitis, and becomes almost indescribable in its long-drawn-out torture. Sometimes it is the reflected or the referred pain which is the most agonising. Thus Mr. Nunn† relates the case of a chimney-sweep with hard carcinoma of the posterior wall of the bladder, who cut off the glans penis with his knife in the vain hope that the pain he suffered in that part would be got rid of.

Tubercle.—The pain of tubercle of the bladder is often described as a severe bellyache. It is constant, largely dependent upon the depth of the ulceration, the state of the deposit of phosphatic material upon the exposed nerves, and the degree to which the eroded edges are stretched by the accumulating urine. Ulceration *per se* does not cause much suffering; it is the movements of the edges which induce the pain.

Cystitis.—The pain of inflammation varies according to its grade, from a gnawing uneasiness in the region of the bladder

* Cf. similar case by author, 'Clinical Soc. Trans.,' vol. xxii.

† Nunn, 'Pathol. Trans.,' vol. xix, p. 264.

to a tearing, lancinating, almost unendurable pain; but in localised cystitis each area has its particular character. Thus, if the base is the more affected, the rectum sympathises; if the neck, the anus, perinæum, and urethra suffer as well; if the anterior wall, the patient can hardly bear the clothes to touch the supra-pubic region.

Prostate.

The suffering of prostatic disease is, for the most part, made up of the different pains which are excited by the disorder in the neighbouring organs—in the bladder by obstruction, in the rectum by extension, in the pelvis and inferior extremities by nerve compression. Capsular tension and inflammation of that part of the prostatic tissue which lies immediately beneath the vesico-prostatic tract are perhaps the main sources of true prostatic pain. The *tissue* of the gland itself is apparently very tolerant of injury or disease. Stones may grow in its substance, cancer and tubercle may slowly develop there without evoking any pain, provided only that no tension is exerted on the capsule, that the prostatic urethra is not unduly narrowed, and that inflammation does not supervene. The clinical character of the *mucous membrane* of the prostatic urethra is a complex and difficult study. As a highly sensitive reflex surface, it possesses the power of translating every variety of stimuli into impulses to micturition. Many of the prostatic irritations are therefore expressed, not as *pains*, but as painless frequent micturition. Its sexual function has endowed it with an extraordinary capacity for inducing reflex neurosis, and as its excitability is greatly exalted by inflammatory states it is when in a slightly congested or inflamed condition that the most varied and startling reflex phenomena arise. Normally more sensitive to contact than the rest of the urethra, the slightest touch with instruments upon it when it is inflamed is able to cause such exquisite pain as to be little short of agony.

Carcinoma.—The softer and rarer variety of prostatic malignant disease may elicit hardly any pain, and may, in fact, remain unsuspected until the sudden retention of urine or obstruction of the bowels caused by the tumour necessitates the rectal examination which reveals it (compare page 191). With the hard infiltrating carcinoma it is far otherwise. Of all diseases of the neck of the bladder, the most productive of

unbearable torture is the denser form of carcinoma. The suffering, which is at first local and dependent on the obstruction, commences gradually. It increases with the tension of the capsule, sometimes ceases abruptly for a time after it has burst through this fascia, but usually recurs, and finally when the disease has invaded the surrounding structures, and has implicated the lymphatic glands at the sciatic notches, it adds the lancinating and paroxysmal agony of compressed nerve tubules to all the pain and misery of a narrowed urethra. I have, however, known the pain to be of an entirely spasmodic character. In these instances it is due to direct implication of the bladder base and compression of the intra-muscular nervous network. The following case will illustrate.

CASE 73 (which is not included in list on p. 191).—A patient, æt. 51, was sent to me by Dr. Liesching, of Tiverton, for any therapeutic suggestion I could make for the relief of an uncontrollable spasm of the bladder due to hard carcinoma of the prostate and the adjoining posterior wall.

The symptoms had commenced with a sudden attack of retention two years previously, and the course had been marked by difficult and frequent micturition and some hæmaturia, but not much pain. For the last nine months a catheter has had to be passed every four hours, and the suffering commenced at the same time as the loss of vesical power. He described the pain as follows:

"It is in the form of an agonising cramp, which comes on an hour and a half to two hours after I have relieved the bladder with a catheter. It runs like a wave from below upwards, increasing in violence until it seems as if I could not bear it. It makes me wish to urinate, but I cannot do so without the catheter. When it reaches its height there is pressed out of my urethra a little yellowish-white fluid. The pain-wave then gradually dies down, and returns in about five minutes. After this it returns again and again, until I relieve the bladder with the catheter. The pain is worse in bed, and in sharp frosty weather."

I have watched patients with hard vesical cancer die with precisely similar agony, which was quite unrelievable (cf. p. 91, foot-note case).

The senile enlarged prostate, on the other hand, if no inflammation or stone be present, produces but little pain beyond that caused by the urethral obstruction.

Urethra.

Situated at the termination of the urinary tract the penile urethra is often the seat of referred sensations. Local pain in this region, unless it is due to an inflamed stricture,

impacted stone, or a hypersensitive granular patch or ulcer, is rare.

“ Referred ” Pain (Reflex or Sympathetic Neuralgia).

Before grouping urinary disorders according to the localities in which the pain is experienced it is necessary to give a brief glance at the phenomenon known as referred pain. Referred pain is that which is felt not in the affected part, but in some other and associated portion of the tract, or in structures remote from the actual site of the disease.* We are familiar with this in all parts of the body. Thus the pain of inflammation of the liver is felt in the right shoulder; the pain of morbus coxæ in the knee.

(a) *Kidney*.—In certain diseases of the kidney the pain is referred to the fellow-gland. Prout† was, I believe, the first to draw attention to the transference of the pain of an affected kidney to its opposite and healthy companion; and Thornton, who has lately emphasised the fact, has recorded one very striking example. A little girl, aged eleven, had symptoms of left renal calculus (typical left renal colic, hæmaturia, and the passage of red sand). Mr. Thornton‡ examined the left kidney by lateral abdominal incision, and failed to detect anything wrong either with the kidney or ureter beyond a few minute superficial cysts on the surface of the former. The hand was therefore passed across to the other side of the abdomen, and it was found that the right kidney was packed with large stones, which were successfully removed.

There is a tendency, however, to give this referred renal pain undue prominence. I am certain it is less often met with than your books will lead you to believe. Do not forget that a kidney may contain large and many stones which do not cause any pain, whilst its fellow-gland—and you remember that renal calculus is bilateral in one fifth of the cases§—may be intensely irritated by a small calculus unfeeling by mere digital examination. I do not say inter-renal referred pain is illusory. I merely impress upon you that you will rarely meet with it.

* Handfield Jones, ‘Functional Nervous Disorders,’ p. 704. It seems to be well understood that unfelt irritations may give rise to very morbid phenomena, affecting both motor and sensory nervous organs.

† Prout, ‘Stomach and Urinary Diseases,’ p. 354, 1840.

‡ Thornton, ‘Surgery of the Kidneys,’ 1890, p. 26.

§ Turner, ‘Lancet,’ 1891, pt. i, p. 145.

The Transference of Renal Pain to Bladder.

It has been known for a couple of centuries, if not more, that renal pain may be transferred to the bladder and experienced in that viscus. Undoubted cases are on record, and I have already quoted one or two (p. 100), to illustrate the existence of bladder symptoms in latent renal disease. But these had reference to *frequency of micturition*, and on that subject I have expressed my opinion that true transference is uncommon, and that in very many of the instances adduced as examples the bladder was also slightly affected, and that the symptoms were due to the extra stimulation of the abnormal conditions in the lower urinary organs by acrid urine flowing from the upper.* This is certainly the case with irritability of the bladder, but with regard to pure neuralgia of the bladder the case is different. I believe pain, "sympathetic" or transferred from the kidney, is not infrequently met with in the bladder and urethra, but there is usually some renal pain also complained of at the same time. Morgagni† speaks of a patient "who complained of very little pain in the region of the kidneys, while he was tormented with pain in the bladder so excruciating in its intensity that five or six physicians who attended him entertained no doubt of the seat of the disease being in that organ. On post-mortem no morbid appearance was discovered in the bladder, and there were large and ramifying calculi in the kidneys."

The bladder pain in some of these cases is apparently due to cramp or spasm of the uretero-vesical walls. The wave of contraction flowing from the ureteral termination into the adjacent vesical wall is clearly seen with the cystoscope, and

* The following case will serve as an illustration of how easily a vesical trouble can be aggravated by latent renal disease, and of the relief which may be obtained by operative interference. A well-built young fellow of twenty-one came complaining of undue frequency of micturition. This he had had for six months. Latterly he had been unable to work on account of a griping pain which used to seize him in the lower part of his belly and double him up. The spasm was at once relieved by passing water. Cystoscopy revealed ulceration of the bladder base on the right side, and rectal examination showed that the right lobe of the prostate contained a small deposit of tubercle. In a few weeks the temperature began to oscillate. The right kidney became tender. Nephrotomy was performed and an abscess evacuated from the cortex. All the symptoms of vesico-urethral disease thereupon disappeared. Had it not been for the thorough examination of the lower part of the tract the entire cause of the symptoms of this section would have been regarded as due to renal inflammation. The patient will be kept under observation, for I do not doubt that the bladder pain will be found to recur.

† Morgnani, 'De Sedibus Epist.,' 42, p. 383. Compare Hartmann, 'Vesical Neuralgia,' p. 47.

from clinical evidence one can readily understand the agony of an aggravation of this normal condition.

One patient who was lately in Cotton Ward is a remarkable illustration of this.

CASE 74.—W. M—, æt. 21, came to me complaining of pain in the bladder, and of passing blood with the urine. As a little fellow, between seven and eight years of age, he had excessive pain over the bladder (supra-pubic region) and at the tip of the penis, which made him run up and down and throw himself about. He was taken to a hospital, where he was sounded, but negatively. The pain continued; every three months he would have a severe attack. His belly would be drawn up into a knot. Sometimes he could pass water, at other times he was unable, but if he did the pain would be eased a little. These attacks varied in intensity. Between the seizures he was in perfect health. He never suffered pain in the loin or back, groin, thigh, calf, or heel, only in the supra-pubic region.

Three years ago he passed a blood-clot on rising one morning, and the next time the urine was all blood. This eased the pain on the pubes. When he consulted me he had no frequency; the urine was healthy, 1010, clear, acid, no albumen.

On examining with the cystoscope I found the bladder capacious and large in every part. The right ureteral orifice was healthy, but the left was not. The orifice of the latter was upraised and irregular in outline; the mucous membrane was prolapsed, swollen, and hypertrophied. The current of urine from the left kidney was sluggishly ejected, and only appeared after a long interval. *The interureteral bar was very hypertrophied.* The right ureteral efflux was rapidly repeated.

I diagnosed a probable obstruction in the lower part of the left ureter, and advised him to have supra-pubic cystotomy, and the stone removed by slitting up the orifice of the ureter. I opened the bladder; it was absolutely healthy, and, beyond a slight thickness of the left ureteral orifice I could find nothing, though I examined bimanually as well as directly. The patient left "cured," but he soon returned as bad as ever. I therefore did left lumbar nephrotomy, and hoped to remove a stone from the kidney, thinking I had come across a true renal transference. This exploration was also without result. The kidney was neither dilated nor contracted, nor could I detect any stone in the upper part of the ureter or pelvis or cortex. Shortly after I succeeded in localising a very tender spot in the ureter at the pelvic brim, and am now tolerably certain a stone is encysted there, not blocking the canal sufficiently as to cause hydronephrosis. I proposed to remove the stone, or, failing this, the kidney, but he assures me he has been well since he left the hospital.

Do not lay too much stress upon "sympathetic" bladders, for this may foster carelessness; but bear in mind that very occasionally pain is felt not in the affected kidney, but in the bladder. If a careful examination of the bladder and prostate by the ordinary methods proves negative the ureteral orifices should be examined by electric light, in order to ascertain if, and which kidney is the cause of the vesical trouble.

Renal Pain transferred to Extra-urinary Parts.

I need hardly remind you that renal pain may *radiate* into the shoulder, groin, testicle, thigh, calf, or heel, but I am not aware that it is ever "*transferred*" to parts outside the urinary tract, without renal pain being also present to indicate the source of the suffering.

It is true that Mr. Butlin* records the case of a patient who complained of a severe neuralgia of the right testis, which was generally retracted and tender. But it was found these attacks were associated with lumbar tenderness and pain, and a small prickly calcium oxalate calculus was removed from the pelvis of the right kidney with complete recovery. Cases also of heel pain have been placed on record due to renal calculus, but there has also been pain in the affected kidney as well.

Transference of Bladder Pains.

To the *kidney*.—In certain cases of bladder disease pain is referred to the kidney. This is, however, usually the result of obstruction to the urethra or ureteral orifices, and the renal pain is the actual result of backward pressure (compare page 37). I am aware that Mr. Henry Morris lays great stress upon this transference of bladder pain to the kidney, and believes it will lead to unsuccessful nephrolithotomy, for kidneys will be examined in the expectation of finding a calculus which exists in the prostate, and which has induced renal pain. I cannot accept his teaching in its entirety, and believe such cases are rare.

Sacrum.—I have known a number of cases of true transference of pain to the sacrum and to the fourth and fifth lumbar vertebræ (compare Fig. 22), and I therefore warn you when your patient complains of backache in vesico-prostatic disease to examine and make a note of its exact position (compare treatment).

Glans penis.—The number of diseases of the bladder and prostate which cause "*transferred*" glans pain are too numerous to touch upon now, but I shall refer to them under the locality of pain. In other instances bladder pain is referred to the lower extremity: for instance, stone in the bladder may cause pain in the foot, and the amount of the subjective torture

* 'Clin. Soc. Trans.,' vol. xv, p. 113.

is hardly credible. Thus Prof. von Pitha,* after giving a very graphic account of his own neuralgic suffering (which sounds, I submit, ataxial), relates the following case of a colleague, Dr. Reisch of Prague, who in 1857 was freed from a large stone by lithotripsy.

"He was an extremely sensitive person, and always expressed his sensation with great distinctness. He indicated, as one of the most precise symptoms of calculus, a sensation as if he were standing with his left foot on a red-hot plate. With each successive diminution of the size of the stone by means of the operation, the circumference of this burning plate seemed to diminish, and at last only a small edge of the sole† remained the seat of this reflected pain. This remaining patch continued obstinate after I had, as I believed, removed all the detritus, and when exploration failed to detect anything within the bladder. In spite of my denial, the patient insisted determinedly that according to his sensations some small fragments still existed at the left side of the fundus. I examined him again, and at the end of several weeks found, at the spot which he had indicated, a small fragment concealed in a fold of the mucous membrane. When this was removed, all pain in the sole disappeared, and the patient for the first time expressed himself satisfied."

Hunter‡ mentions that Lord Cavendish's father always felt pain in the left arm from a stone in the bladder, and that this pain was the only indication of a want to make water.

Transferred Pain in Urethral Disease.

It has long been recognised that urethral disease may give rise to transferred pain.§ It is said that this was first insisted on by Luxmoor. Brodie drew marked attention to the condition, and reported the following very conclusive instance.

"A gentleman consulted me concerning a pain in one instep. The pain was severe, causing lameness, so that he walked with difficulty; but there was neither swelling nor, except the pain, any mark of inflammation. I prescribed some remedies, which, however, were of no avail. One morning he called on me still suffering from the pain in his foot, and so

* Professor von Pitha, 'Medical Times and Gazette,' September 25th, 1875, p. 356.

Ibid.: "It were to be desired that every practitioner should suffer once in his life for the shortest possible time in his own person these subjective tortures which manifest themselves by no external sign; only then would he be in a position to form a just estimate of the sufferings of others."

† It must be remembered that pain in the heel (talalgia) is met with in gout, tabes, pregnancy, and anal disease.

‡ Hunter, edited by Palmer, 1835, vol. i, p. 321. Compare a good article upon "Pododynia," by J. B. Curtis, 'Boston Medical and Surgical Journal,' April 7th, 1881, p. 316.

§ Brodie, 'Local Nervous Affections,' 1837, p. 12.

lame that he could not get out of his carriage and walk into the house without the assistance of his servant. Now, however, he complained of another symptom; he had a difficulty of making water, and a purulent discharge from the urethra. He had laboured under a stricture of the urethra for many years, and had occasionally used bougies. Of late the stricture had caused more inconvenience than usual, but he had abstained from mentioning it, thinking that it would be better that he should (if possible) be relieved of the pain in his foot before any treatment was adopted on account of the stricture. Under these circumstances I introduced a bougie which penetrated the stricture and entered the bladder. Immediately the pain in the foot abated; and in less than a quarter of an hour he left the house free from pain, and walking without the slightest difficulty. This happened some years ago, but I have seen the patient at intervals ever since; and, from a most careful observation of his case, he and I are both satisfied that the pain in the foot is connected with the disease in the urethra, and we have never found anything to relieve it except the introduction of the bougie."

I can record a dozen well-marked examples, and have already published four.* Quite lately, I have had under my care a gentleman from South America who was suffering from pains in both forearms whenever he made water. I found a prostatic-membranous catarrh which was treated topically, and as it yielded, so the pains in the arms on micturition disappeared.† I may mention that all pain in the urinary tract, as elsewhere, is greatly aggravated by gout, old syphilis, and malaria.

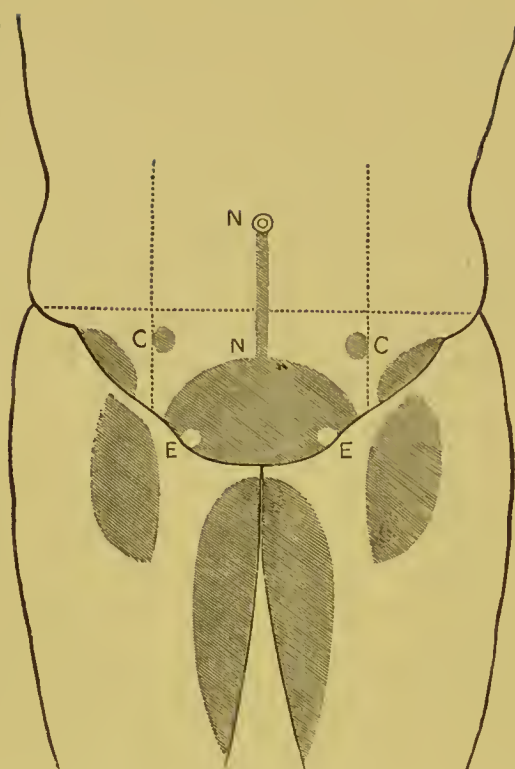
Localities of the Pain in Urinary Disease.

In recording the exact positions of the painful areas my patients complain of, I am in the habit of using these diagrams. It will shorten and simplify my remarks if you follow me upon them. The large supra-pubic shading in Fig. 21 represents the diffused pain which is felt in that region in certain diseases of the lower urinary organs. These may be tabulated into those pains which are constant and those which depend for the most part on the act of micturition.

* Author, 'Med. Soc. Trans.,' 1888, "A Novel Extension of the Uses of Cocaine;" also 'Electric Illuminat.,' 2nd ed., p. 243, Cases 70 and 71.

† Like cases may be found quoted in Vaulair ('Les Neuralgies,' p. 330).

FIG. 21.



Diffused supra- pubic pain	Constant	Unrelieved advanced atonics. Chronic prostatitis Carcinoma of posterior wall and base (advanced)	{	Abscess, pericystitis, perforating apical carcinoma.
		All extra-vesical inflammation, <i>e. g.</i> Rare primary ureteral disease		
	Transient	Started by micturition	{	Prostatic enlargement without much residual.
		Relieved by micturition		Cystitis of all grades. Ulceration of female bladder, tuberculosis of bladder in both sexes.
		Increased by micturition		Certain forms of prostatic inflammation. Onanitic prostate. Sarcoma of prostate? Cramp of a semi-touteless bladder of stricture.

Roughly, then, the supra-pubic pain of the diffused type is the expression of disease in three structures—the bladder, the prostate, and in rare instances the ureter. The transient

pains are usually evoked by two causes, crampy muscular effort and the stretching of inflammatory surfaces. The constant type is most often the outcome of nerve compression (carcinoma) or nerve exposure (ulceration). You notice, however, that there are other areas to which I have to draw your attention. The small area *c* to the inner side of the mid-Poupart line represents the spot where tenderness is often complained of after an attack of renal colic. This area represents the flexure of the ureter over the brim of the pelvis, and it is here also that pain from stone impacted in the ureter at the pelvic brim is referred. I have had five undoubted cases under my care. I have noticed an interesting fact in connection with these cases to which I now draw your attention. As you are aware, an impacted ureter usually causes suppression of the function of the corresponding kidney, or hydronephrosis from backward pressure if the obstruction be intermittent or only partial. Also that impaction usually takes place at the upper end or near the vesical orifice of the tube (Morris). In the cases of impaction near the brim of the pelvis which I have had under my care there has always been some passage for the urine; for on cystoscopy a thin sluggish tricklet of water was seen issuing at long intervals from the orifice of the obstructed ureter.

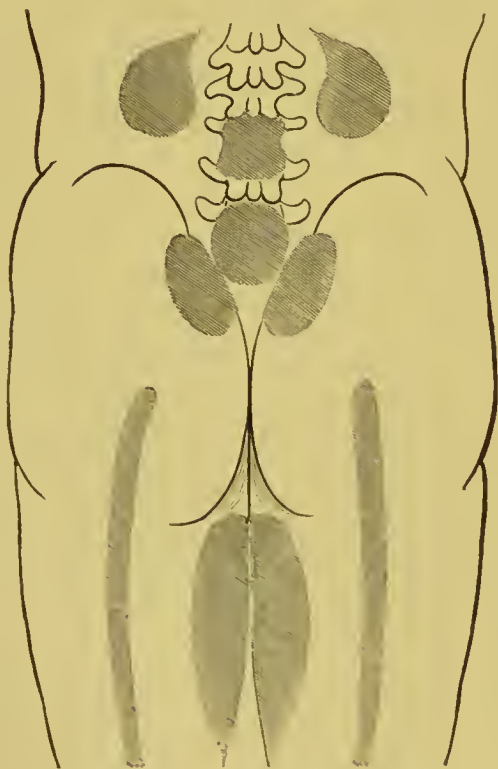
This condition was usually in marked contrast to the opposite ureter, which pumped quickly, powerfully, and fully, and gave me the impression that its kidney was doing extra work. Again, in three cases in which the impaction had been maintained for long the kidney was explored, and hardly any evidence of backward pressure could be found. I would suggest that the pliancy and dilatability of the ureter in the middle third allows of even large stones becoming pouched, and thus dangerous obstruction is avoided;* whilst towards the ends of this tube the greater fixity, thickness, and abrupt bendings which are found in these positions favours complete blockage.

If the pain at *c* or near *c* be transient and relieved by micturition, it is usually caused by slight stressing of the bladder at the postero-lateral wall or by a dilated ureter. The clear circle at *E*, overlying the ring, is often associated, in the absence of hernia or funiculitis, with change at the corre-

* These remarks were made before I heard that Mr. Rickman Godlee had pointed out "that urine and pus and blood may escape pretty freely past a calculus of very considerable size which is lodged in the middle of the ureter" ('Clin. Trans.,' vol. xxii, 155).

sponding ureteral orifice. Pain from the navel to the bladder, NN , is usually of the character of *tic-doloureux*; and is distinctly neuralgic, apparently started by irritation at the vesical orifice. The pain shoots from the navel straight through the bladder along the entire penis to the glans. It is not common. The shadings on the outer edge of Poupart's ligament below it and on the inner thigh, indicate pain usually found in relation to advanced carcinoma of the bladder base or prostate. The former seems to be the direct result of gland affection, for it arises when the glands in the groin are becoming lumpy from growth implication. That, however, in the inner side of the thigh is most probably due to pressure upon the obturator or small sciatic nerves whilst in the pelvis.

FIG. 22.



Now turn to Fig. 22. The sciatic and inner thigh pain is not only found in hard carcinoma of the bladder base or prostate, but also in many cases of acute prostatic inflammation. The shading over the fourth and fifth lumbar vertebrae refers to the "prostatic backache" which is so frequently

complained of. This is especially in relation to sexual excesses and other causes of congestion of the prostatic canal. I have also noticed it as an accompaniment of vesical tumour of the non-malignant type, and have found it subside on the ablation of the growth, and return on the recurrence of the vesical tumour. There is a very interesting pain overlying the sacro-iliac synchondrosis. The exact reason for the pain in this region I am unable to give, but I have observed it in a large number of vesical cases, mostly in females with ulceration of the bladder. In one case of prostatic carcinoma it was evidently due to temporary block in the gluteal vessels.

FIG. 23.

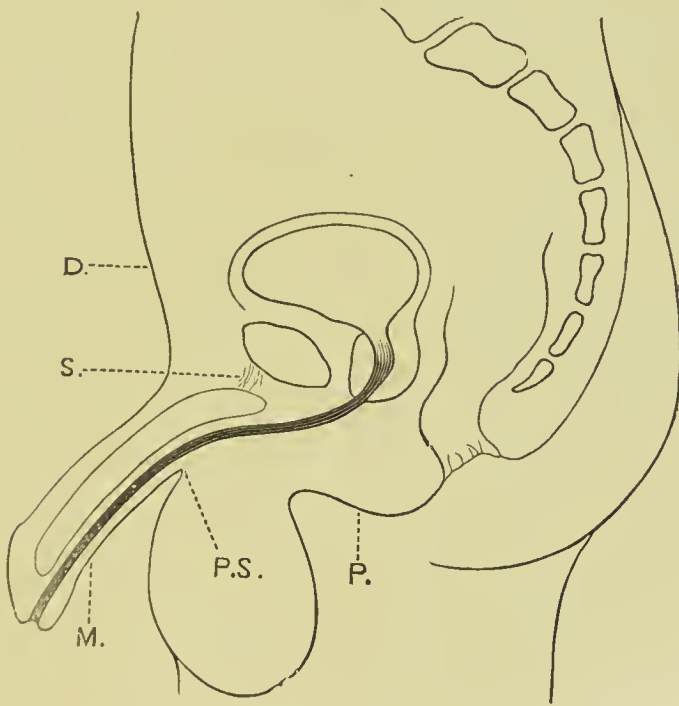


Fig. 23 represents the positions of urethral pain.

General penile pain.—Youthful masturbation and coitus reservatus (*seu congressus interruptus*), or “*onanismus conjugal*is,” as it is sometimes termed, is a fruitful source of obstinate pain along the dorsum and sides of the penis.

Perinæal pain (P).—Pain felt in this region (“*crutch*” pain) may either be constant, or it may stand in some relation to micturition.

Constant perinaeal pain		{ Chronic prostatitis. Commencing senile enlargement of the prostate. Encysted calculus at base of bladder. Carcinoma of prostate.
Transient perinaeal pain	Relieved by micturition	{ Acute prostatitis. Tubercular disease of bladder base and tubercular prostate ("quiescent" stage).
	Increased by micturition	{ Calculus, either encysted in base or low down on posterior wall, or pouched in a depression behind an upraised prostate. Catarrhal or tubercular ulceration of bladder behind trigone ("active"). Local conditions: suburethral abscess, inflamed stricture, impacted stone, carcinoma of bulb.

The peno-scrotal angle pain, P.S., is, I believe, usually due to local congestions. The acute bend which the flaccid penis forms with the fixed urethra favours and perpetuates such changes of surface. Pain referred to the suspensory ligament, S., needs very careful consideration, for it may lead to the recognition of disease in the part of the prostate anterior to the urethra. My cases are not as yet sufficiently numerous to speak definitely upon this point.

To do more than tabulate the diseases which give rise to urethral pain is needless in all except those which cause pain at the end of the penis. Upon this subject I must be more diffuse, because you are so impressed by the statement in some of your text-books that pain at the end of the penis is pathognomonic of stone in the bladder. By others it is taught that it is either some form of foreign body (stone, growth, clot, hydatid sac) which gets swept into the sensitive orifice of the bladder and obstructs the outflow; or it is some disease at the vesical neck which resents the contraction of the bladder upon it, such as an inflamed prostate. This is now somewhat old-fashioned. *Sudden distension, localised extravasation, or inflammation of any part of the urinary tract from the kidney to the end of the penis may, I do not say will, but may cause this pain.*

Let us consider the symptom more in detail. There are two varieties of glans pain—one constant and independent of micturition, the other bearing some relation to the act.

Constant glans pain.—Constant pain in the end of the penis, either at the lips of the meatus or around the corona, or under the glans, is raro. I do not understand the pathology of it. It is quite different in its character from the pain experienced at M., Fig. 23, half an inch down the canal, which is called the "stone pain," and stands in relation to micturition. In the

majority of instances it proves a most obstinate affection, and in some instances at least, if I may credit the cystoscope, is of prostatic origin. I used to consider it a prodrome of some nerve change like locomotor ataxia, but this is not correct.

Constant glans pain	{	Prostatorrhœa.
		Catarrh of the prostatic canal; swollen verumontanum.
		Cracks?
		Enlarging median or lateral lobe of the senile prostate.

I can point to fifteen cases of constant glans pain.

I have had one patient under my care whose pain has lasted twenty years. The orifice of his canal is of a deep bluish hue (argyria), due to the constant application of nitrate of silver. Another who had suffered for twelve years, and had been in two London hospitals, and sounded under ether, was examined with the light, and a diphtheritic erosion was found just within the meatus. It was touched with iodine and the patient was immediately relieved. Another has appeared every few weeks for five years, and always insists on being cauterised just within the meatus, as this is the only relief he can obtain from a constant gnawing pain at the extreme end of the canal. There are no symptoms of ataxia or renal stone, no change in the urine, no structural alteration in the penile urethra. All that I can find is an excessive dilatation of the mucoid glands at the bladder neck, and this is hardly sufficient to account for these symptoms. Some light has been thrown on this form of pain by Mr. Arbuthnot Lane, of Guy's Hospital,* but the case he records may only be an example of one of many varieties, for I have cut through the prostatic bar in one case, dilated the prostate and drained the bladder for a fortnight in another, without affording the slightest relief. Mr. Lane's case is worthy of your attention.

Very severe pain in anterior extremity of urethra; suprapubic cystotomy; forcible dilatation of contracted prostatic urethra; recovery.—J. W. P.—, æt. 42, builder's foreman. His mother died from consumption, and his six brothers and sisters from various diseases—two from inflammation of the lungs, one from abscess in the side, one from blood-poisoning, and two from convulsions in infancy. He was a married man, and had always been stout and vigorous till the onset of his present symptoms. These developed about the middle of 1888, and consisted of almost unbearable pain in a position corresponding to the floor of the anterior extremity of the penile urethra. This pain was so violent and constant as to make it impossible for him to continue his occupation. He was unable to eat his meals, and he lost flesh rapidly. He stated that he was for some time an out-patient at St. Peter's Hospital, where nothing was

* 'Lancet,' May 24th, 1891, p. 931.

found, and his pain was not relieved. I saw him at the out-patient department of Guy's Hospital, and admitted him into the hospital under the care of a colleague. When under observation, it was seen that though the man complained of constant pain, he was subject to violent exacerbations lasting from a few minutes to three or four hours. During these attacks he appeared to be in the greatest agony. Though the pain was increased by his getting about, yet he had severe attacks when kept perfectly at rest. The right testicle was undescended. Nothing could be made out by examination with the cystoscope, sound, finger, &c., either at this time or on subsequent occasions. His weight was about 8 st., and he appeared wasted and distressed. His usual weight was about 10 st. His urine was acid, sp. gr. 1008, and contained no blood or pus. Some crystals of triple phosphate were present. He was treated with various drugs, dieted, and kept in bed for some time, and apparently with some benefit. He left the hospital on September 1st.

He was readmitted under my care on September 22nd, having spent three weeks at a convalescent home. He asserted that it was impossible to continue life in his present condition. Considering that the cause of the pain might be some condition of the prostate not apparent by the cystoscope, sound, or finger in the rectum, I determined to open the bladder above the symphysis, and examine it bimanually. I may say that I had carefully examined the position of the kidneys and ureter, and made him take violent exercise of a varied nature, to find if possible any complaint of pain elsewhere than in the end of the penis, or any alteration in the urine, without any success. Therefore, on October 22nd, I opened the bladder above the symphysis, and found its interior healthy, as we had previously found it on examining it with the cystoscope. On attempting to introduce the tip of the little finger into the prostatic urethra, the greatest resistance was felt, and it was only after using much force, both with the finger and with instruments, that it was possible to dilate up this portion of the urethra. Nothing abnormal could be detected in the prostate except that its right lobe was smaller than the left. Hardly daring to hope that this dilatation of the prostatic urethra would be of any service to the patient, I introduced a drainage-tube and closed the wound. On November 1st the drainage-tube was removed, and he passed urine through the urethra. (The reason I took the unusual course of introducing a drainage-tube into a healthy bladder was that I wanted to keep the prostatic urethra at rest for a few days.) He was delighted to find that he had lost the pain since the operation. He left the hospital on November 8th, with the object of spending some weeks at the sea-side. I saw him about the beginning of this year, and found him looking strong and in much better condition. At times he said he felt a very slight pain in the position of his old trouble, but it did not seem to cause him any concern.

I felt that this case deserved to be put on record because of the obscurity of the causation and pathology of the condition of the prostatic urethra, of the apparent causal connection of the prostatic stenosis with the local penile pain, and of the happy termination, almost accidentally arrived at, of a complaint which would not only have considerably abbreviated the course of the man's life, but would also have rendered it exquisitely miserable, if in all human probability the intensity of his misery did not lead him to terminate his existence. I trust that this communication may lead others to publish accounts of some similar cases they may have observed, which may help to throw light upon this condition, apparently a very rare one. Should

the pain recur in this case I will dilate the prostatic urethra forcibly and extensively with a suitable lithotrite.

I regret to say that after a time the local pain returned, but with less severity than before. Forcible dilatation of the prostatic urethra relieved this pain, though it did not remove it. No further light has been thrown upon the condition since the first operation.

The following is a case I have still under my care, though I have failed absolutely to relieve him, and am quite uncertain as to my diagnosis.

CASE 75.—Mr. C. L.—, æt. 51. Up to six years ago he was in perfect health, being an energetic and vigorous, and, according to his wife, a foresighted and sensible man. He was at this date suddenly seized with a violent pain in the back, which lasted three months, then a tenderness commenced in the pelvis, and this has been constant ever since. He was sent to me by Dr. Law, of Sydenham. He crawled into my room like a very infirm old man, carefully avoiding any brusque movement, and after much tender manipulation he uncovered a small cold penis from its voluminous wrappings. The corona was perhaps a little more purple than natural, and with a stretch of imagination one might have declared the dorsal veins of the organ to be larger and fuller than normal. The excessive care he took not to shake the penis, the constant pain he complained of, and the frequency of micturition which was present in the day made me suspect a calculus. But when I learnt that he had free urination, no pain after the act, pellucid water, had never seen blood, and no other symptoms of stone in the bladder were present, I was inclined to believe it was one of those rare cases described by Ultzmann as a “*crack*” in the prostatic mucous membrane.

“The character of his sufferings is somewhat uncommon. He declares it is around the corona where the pain is situated; it is a sort of pressure, as if he wanted to pass water, or as if there was a big instrument in the urethra, and it was being rammed through. Sometimes there is an expansive feeling of the glans as if it was full of blood and bursting; it subsides directly he passes water. If the corona is firmly grasped it does not hurt him, but a very light touch is agony. There is also great pain in the groins like a rope constricting the parts. Underneath, where the pressure comes, on sitting down he has a bruised funny-bone feeling, a nervous tingling pain. He has supra-pubic pain on expiration, and occasionally post-scrotal pain for a day or two. Erection causes a shooting meatal pain to course along the penile urethra. The bones of the pelvis, hips, and thigh are sore and tender. When he lifts up his feet or his arms it hurts him all through the belly (? increased blood-pressure).”

Frequency.—“Sometimes the urine comes free and easy, but often it is tight.” He passes it every hour in the day, and never gets up at night. He can hold it four hours at times. In the daytime he sometimes feels as if he was going to burst, although he may just have passed urine. Stream large and powerful—urine clean and healthy. No symptoms of renal stone. Pupil reaction perfect, no swaying; knee-jerks excessive; no symptoms of spinal cord degeneration. Testes healthy, prostate small *per rectum*, not unduly hard.

Personal history.—He married in 1864. He never had venereal disease—in fact, he denies coition before marriage, onanismus conjugalis; three children. Seven years ago he became bad, a darkness began to show itself across the corona, which commenced to be painful and swell, then after a bit he felt pain

deeper in the passage, and finally it got into the bladder. His urine from the very first was irregular, he did not secrete much. I tried all manner of drugs, cocaine only relieving him, and slightly.

One day I made him bleed with a large bougie, and the pain and constant pressure went away. Dr. Law had done the same thing with the same result. Nothing that he has done or that has been done for him has given him much relief.

Noticing the fact that he was relieved by bleeding from the prostate, I examined the bladder with the cystoscope. There was nothing abnormal to be seen with the exception of a very irregular-surfaced trigone, the mucous glands in it being remarkably swollen and large. I incised the prostate without relieving him.

Glans pains is, however, met with in relation to micturition. That complained of before the act being an expression of some obstruction to the vesical mouth of the urethra, that during the act is most often due to some slight local change near the meatus, or to the passage of highly concentrated urine. Pain after micturition in the glans has a variety of causes. You will realise this by a glance at this lengthy list, and see how futile it is to diagnose stone in the bladder from this single symptom.

In women, all the symptoms of that rare female disorder, stone in the bladder, can be induced by disease in the pelvic organs affecting the bladder by contiguity. Most marked of all the symptoms thus produced is the pain at the meatus *after* micturition.

Trans- sient glans pain	Before mie- turition	{	Clot retention.
	During micturition	{	Senile prostatic obstruction.
			Local lesions—inflammation, granular patch.
	After micturition	{	Inflamed congenital fold, ulceration, wart, narrow meatus.
			Stone in the bladder.
			Tubercular and other ulceration of posterior or lateral walls of the bladder.
			All forms of acute localised cystitis in any part of the bladder.
			Cystitis of neck.
			Vesical growth engaging or impinging on urethral orifice.
			Acute prostatitis.
			Inflamed onanitic prostate.
			Inflamed senile prostate.
			Severe vesical spasm of renal origin.
		{	Sudden ureteral block.
			Renal colic.
			Sudden ureteral kink, as in floating kidney.

Most of the diseases in this bracket have been illustrated by cases recorded in the preceding pages.

Here is a striking example from Mellish Ward.

CASE 76.—This young fellow, æt. 30, was sent me by Dr. Ayling for an acute attack of cystitis. In 1878 he had "pyæmia" in Germany, his left hand became swollen and inflamed, and a piece of bone worked out. His left hip became diseased and ankylosed. He was treated by Professors Madelung and Busch. He got better in 1882. Subsequently his right knee became affected, and Mr. Henry Morris removed a piece of necrosed bone from the lower end of the femur. In 1884 the old abscess in the left hip opened. In 1885 an abscess formed apparently on the inner side of the left acetabulum, for the patient states it burst into his bladder and discharged pus and blood through the urethra, the pain ceasing in the hip. These abscesses have formed three times, and they have evacuated themselves by the same route. In 1886 an abscess formed by the rectum, and a piece of bone came out. Apparently this was the conclusion of the matter, for he has been in perfect health since then until the present attack, six weeks ago.

A month previous to seeing me he began to suffer supra-pubic pain *after passing water*. It was not in the penis at first. There was no frequency and no blood. Dr. Ayling relieved this pain by means of alkali, hyoscyamus, and buchu, but it returned. A week before seeing me he was suddenly seized, whilst micturating, with a severe pain at the inner side of the supra-pubic area (a little higher up than where E is placed, Fig. 21) and along the penile urethra to the glans. This continued, became constant, and quite independent of micturition. The frequency was every three hours in the day and once at night; when the call came it was urgent, but not imperious. The stream was twisted and curled. He has never had coition. Testes are perfect and healthy. No signs of tuberculosis.

Present condition.—"The left hip is covered with deep scars before and behind, it is ankylosed in fair position, the limb is shortened, the lower and inner end of the right femur has a deep scar over it. The urine is acid, 1020, straw-coloured, clear, $\frac{1}{3}$ albumen, no casts, but irregular-shaped uric acid crystals. I ordered the patient to take a drachm of collinsonia thrice a day, and advised him not to be cystoscoped, as probably another abscess was going to break into the bladder. He returned in a week saying that he had been free from pain after the fifth dose of collinsonia, the urine was clear, and he wanted to know what had been going on. My examination is described in my letter to Dr. Ayling.

"Oct. 15th, 1892.—DEAR DR. AYLING,—I have examined the urine very carefully, and though I find albumen in the urine I have discovered no evidence of casts. But this is not the trouble for which you sent the patient to me. With the electric light I find that he has a well-marked patch of (sessile) sub-viloid growth the size of a threepenny bit on the left lateral wall low down. This patch is placed upon a healthy base, and the neighbourhood is uninflamed. The rest of the bladder is healthy. From this and the history I may be permitted to hand you the following diagnosis.

"The subviloid (warty) patch is the index to an irritation which has approached the bladder from without, and has probably been induced by an abscess which I learn burst three times into the bladder from a pyæmic hip (left) collection. The patch remains as the evidence of bygone irritation. The attack he has just passed through is due, in my belief, not to another abscess, but to an over-acid tide affecting the subviloid growth, because the base of the patch and the surrounding mucous membrane are unaffected and uninflamed. What treatment should be adopted? I have given him soda salicylate, which I think will allay any further irritability and pain. Do I recommend operative removal of the subviloid growth? Not at present. My advice is for him to wait and watch events."

In a week's time this patient returned to me with a temperature of 102°. A tenderness on rectal pressure existed at the left inner pelvic wall over the obturator internus, and the tissues in this region felt thick. I was inclined to suspect a pelvic abscess was burrowing along towards the anus. The urine was very light, and deposited $\frac{1}{8}$ mucus with floating flakes of pus. Frequency was every half-hour in the day and once at night. I admitted him into the hospital, the temperature dropped, and there have been no further symptoms. Probably the rise of temperature was due to the cystoscopy.

Permit me again therefore to impress upon you the following fact, which is, I know, contrary to accepted teaching, but the truth of which I can sustain by very many cystoscopic examinations. *Glans pain after micturition does not necessarily point to trouble about the neck of the bladder. The symptom can be evoked by disease of any part of the bladder, ureter, or pelvis.*

Pure (Idiopathic) Neuralgias (without appreciable lesion).

"Neuralgia" of the urinary tract possesses a literature as misleading as it is voluminous. There is little doubt in my own mind but that recorded cases of true neuralgia will become less abundant as our diagnosis of appreciable lesions becomes more accurate, and our investigation into the causes of the pain more searching and scientific. The terms nephralgia, cystalgia, urethralgia, are often for the slovenly surgeon what latent gout is for the careless physician—a diagnosis without trouble.

Before permitting ourselves to diagnose a case as being one of idiopathic neuralgia we should carefully exclude all sources of neighbouring irritation, such as erosions of the os uteri and other affections of the pelvic viscera in women, rectal, colonic, vulvar, or preputial troubles. It is significant that most of these induce frequency of micturition (*v. p.* 94) as well as neuralgic pain about the bladder (symptomatic neuralgia).*

True vesical neuralgic suffering without appreciable lesion does exist, but I believe it is rarer than is generally accepted. I have met with it in patients who have been profoundly poisoned by some septic material, such as that of influenza or malaria, or in the slighter septic absorptions which produce a sub-variety of rheumatoid arthritis. I have also noticed it as a prodrome of locomotor ataxia, and it is in this disease that its clinical aspect is most puzzling and eccentric.

* The distinction between idiopathic and symptomatic neuralgia is, I must allow, often very difficult.

Vesical Neuralgias of Septic Origin.

The celebrated surgeon Professor von Pitha* thus describes his neuralgic sufferings:—"I had been, as a consequence of poisoning by pus during an operation, suffering during two years from the most excruciating eccentric neuralgia, which, with the exception of the head, neck, and back, affected in turn every part of the body. In the early acute stage the two shoulder-joints were successively attacked by the most violent boring pains, which, after lasting four hours, suddenly and completely disappeared. Thence the pain darted off to the pelvic region, affecting the bladder, especially its neck, and then the entire urethra—producing the exact sensation of a heated wire being passed along it into the bladder. At a later period the pain was confined to the neck of the bladder, simulating perfectly all the symptoms of stone. I felt with the utmost distinctness the spicula on the surface of the calculus, being forced during the paroxysm into the orifice of the bladder. I pictured to myself the exact form, size, and weight of the stone. Gradually I lost this sensation completely, and it only accidentally reappeared in a milder degree at the end of two years. While jumping over a ditch I suddenly experienced the sensation of stone in the bladder striking against the symphysis. So plain did the existence of the stone seem on various occasions that all the preparations were made for lithotripsy; but, to my great astonishment, the most careful exploration of the bladder repeated five times failed to discover the calculus, and I became convinced at last that it did not exist."

I have not actually seen vesical neuralgia as a consequence of septic inoculation, but the following is an example of neuralgia following influenza,† given in the language of a common-sense, active, and successful practitioner.

CASE 77.—Dr. D—, æt. 35, a bilious subject suffering from occasional neuralgic headaches. Had never had syphilis or venereal disease of any sort. Had been in capital health, though overworked, until April, 1891, when he had a second attack of influenza (the first being in February, 1890, and without sequelæ). After the fever passed off he experienced a severe pain in the perinæum, which lasted some hours. This pain forced him to go back to bed; it was not influenced by micturition. He soon began to have

* Von Pitha, 'Medical Times and Gazette,' 1875, p. 358. These symptoms are very suspicious of ataxial origin.

† From the many and varied manifestations of influenza upon the urinary organs I cannot but agree to the septic character of the disease.

discomfort on micturition at the moment of starting the stream, which he referred to the suspensory ligament (s, Fig. 23). The urine was neutral, 1022, and contained mucus, but no pus; he passed it every four hours in the day, and did not get up at night. He had no urgent pain up to August 12th, 1891. He went to London at that date, *en route* for Wiltshire, and the jar of the carriage caused him an extraordinary amount of pain, which seemed to pass through the pubic bone. He could not sit still. All the fasciæ in the neighbourhood were very tender, and resented the slightest pressure. Sitting was impossible for a week after this journey; riding or driving was agony, but he could walk. After a week the pain lessened. He considered this rheumatic gout, for there was gout in the family on the mother's side. Being forced to return home by railway from his holiday in Wiltshire, the jolting reproduced all the former pain and discomfort. Soda salicylate and ergot relieved him very quickly.

Since September, 1891, he has had attacks every five days or so of "hideous sensations all round the genitalia, intense discomfort amounting sometimes to pain. The organs are extremely sensitive; sitting on a stuffed chair, or in fact on any surface which causes perinæal pressure—evokes the greatest uneasiness and pain in the pubic joint. If he could hook his finger under the pubic arch he could reach the spot. He suffered greatly from frequent and painful erections, and nocturnal losses aggravate the misery until he feels that he could tear off the penis and testicles and be done with his sufferings." During these bouts he passes much limpid urine. On examining him I noticed a sweetish smell in his breath, and though I could find no trace of sugar in his urine, I inquired as to diabetes,* and found that his mother and grandfather had died of this disease. He had no symptoms of ataxia, renal stone, or of any urinary disease. The entire arch and body of the pubes, especially the centre, was very sensitive to pressure, also each ramus;† the urethra itself and both lobes of the prostate were extremely tender. I diagnosed a true neuralgia, probably of gouty or rheumatic character, started by an influenzic prostatic catarrh. He improved greatly with ergotine, blistering, and a suspensory bandage.

Idiopathic Vesical Neuralgia (Pain Crisis‡) as a Prodrome of Locomotor Ataxia.

Neuralgia of the lower urinary tract may be a premonitory symptom of locomotor ataxia, or the pain may develop simultaneously with the tabetic incontinence, frequency, or retention. Case 78 is an illustration of this prodrome.

* Diabetes is credited with evoking true vesico-prostatic neuralgia, but I have not met with a case. I have had under my care a medical man suffering from glycosuria, who was attacked by acute membrano-prostatitis after the influenza subsided. It subsided without neuralgia.

† The periosteal coverings of these parts often become inflamed in vesico-urethral inflammatory disease, and are then markedly tender on pressure.

‡ Dr. H. C. Wood describes a pain crisis as consisting in its essential parts "of a paroxysm of pain as violent as human nature can endure, accompanied by excessive functional activity of the part attacked, but disappearing as rapidly as it appeared, and associated with a condition of undisturbed functional activity of the affected viscus between the paroxysms."

Verneuil* reports the case of a patient who suffered for two years from cystalgia before the onset symptom of general paralysis; and Gergaud† relates in his thesis the history of a patient who presented himself at Salpêtrière with all the symptoms of locomotor ataxia, and showed a diagnosis slip which had been given him at the Necker Hospital two years previously—"Vesical pains, probable ataxia." Fournier, in his work on 'Tabes,' cites other examples, notably one in which vesical symptoms appeared five years before the first attack of lightning pains.

The Character of Tabetic Urinary Pain Crises.

The pain, which is usually in the neighbourhood of the bladder and prostate, is often excessive, and if there is no apparent urinary cause to account for its severity a clue to its nervous origin is then afforded you. It may or may not be accompanied by "lightning" pains in other regions. There is a sensation of weight in the bladder, or a burning, lancinating, or tearing pain, which radiates to the groins, penis, testicles, or thighs. The pain may be continuous, or may intermit for days, weeks, or months, disappearing as suddenly and as causelessly as it came. The suffering is often increased by coitus, or by the exploration of the urethra with a sound (compare Cases 80, 81). It usually subsides as the disease advances. Professor Fournier,‡ who has carefully studied the subject, has given a very vivid description of the suffering; and though I am quite ready to accept it as being a true description of pain experienced by one of Latin extraction, I am not familiar with it in English-speaking people,

* Quoted by Hartmann, 'Névralgies vésicales,' p. 46.

† Quoted by Jamin, art. "Vessie," 'Nouveau Dictionnaire de Médecine,' p. 364.

‡ A. Fournier, 'Leç. sur la préataxie du Tabes,' Paris, 1885, p. 41. "Si bien que sous le coup de ces douleurs multiples le malade anxieux, affolé, s'agite, geint, erie, se démène, se tord sur son lit, change de situation à toute minute, se plie en deux, se couche à plat ventre, &c.; bref, prend les attitudes les plus variées et les plus bizarres, en vue d'en trouver une propice et d'échapper à l'angoisse qui le torture. Et cela dure ainsi un certain temps, très variable du reste suivant les sujets, voire d'une attaque à l'autre chez le même sujet. Quelquefois une crise de ce genre ne dépasse pas une demi-heure et autres fois elle persiste plusieurs heures. Il n'est même pas rare qu'avec des alternatives de rémission et d'exacerbation elle se prolonge deux ou trois jours.

Puis, autre fait non moins eurioux, une détente soudaine de tout cet ensemble morbide se produit à un moment donné. Les douleurs des divers sièges diminuent et s'apaisent, le ténesme disparaît et tout est fini 'comme par enchantement.' Pour cette fois le malade est guéri."

who, I believe, are affected less by pain than their Gallic neighbours.

Here is an illustration of the character of these pains :

CASE 78.—A patient æt. 49 was in McIlish Ward two years ago with vesical symptoms of a very unusual type. He was sent to me with a diagnosis of stricture, and complained that he had been forced to strain to make urine for two years, but without an increase of frequency. The straining had latterly become worse, and he had had incontinence at night. During the last three months his doctor had diagnosed stricture, and had dilated (?) him to 8 English gauge. Since then the incontinence had ceased, but a dull pain in the perinæum, penis, and lower belly had appeared. This pain was not persistent. It came on every day, generally lasted six hours, and during the time it was present he was unable to pass water. There were no symptoms of ataxia. The urine was 1015, clear, acid, no albumen, no sugar. He was cystoscoped, but the only note I made was "Beyond an appearance of age and fasciculation, the bladder is healthy." The patient became feebler, he gradually wasted, his skin became dry and brownish, and the periodical pain more severe. To my eyes he appeared to be suffering from visceral carcinoma which I could not detect, and I wrote to his medical man to say that I did not understand the case, but the bronzing, wasting, and weak pulse looked suspiciously like Addison's disease or latent carcinoma. I sent him home unrelieved, and lately I have heard, by the courtesy of Dr. Warner Lacey, of Woolwich, under whose care the patient subsequently came, that he has developed definite symptoms of tabes, and that the diagnosis has been confirmed by Dr. Perry, of Guy's Hospital. I see now with extended experience that such vesical crises of pain co-existing with a history of incontinence at night and difficulty of urination ought to give rise to a suspicion that a lesion of the spinal cord is present.

I do not think you will often* meet with such cases; usually the vesical crisis, if it occurs at all in tabetic subjects, will be coincident with other symptoms of the spinal complaint, which will enable you to form a diagnosis. For a note upon the injudicious treatment of these cases see page 248, Cases 80, 81.

Diagnosis of the Cause of Pain, and Treatment.

It is hardly necessary for me to dwell upon the importance of an accurate diagnosis in order to "cure" the pain. Unfortunately in many cases the patient clamours for immediate relief, and you have to act upon a provisional diagnosis. Your treatment is then directed against a symptom, and probably your success will largely depend on your careful selection from the array of sedatives at your disposal.

Pains in the loins (compare p. 37).—The three groups of pain in this region which you will be most often called upon to relieve are rheumatic conditions of the muscular and fibrous

* Fournier met with cystalgia 21 times in 115 cases of tabes (18 per cent.).

tissues of the loins of those passing uratic urine, true renal pain, and sympathetic pain from vesico-urethral disease or pelvo-abdominal visceral affections. The patient must in all cases be stripped, and the back carefully examined. No reliance must be placed upon the patient's statements as to what the pain is or where it is situated; a neglect of this rule often ensures failure in diagnosis and treatment. Lumbago and renal pain, and especially the former, are characterised by the pain being increased by bending or straightening the back or twisting from side to side. Renal pain is marked by its position (Fig. 22), by acute localised tenderness on pressure on the front of the kidney,* by stabbing pain in the kidney on succussion, or percussion (Jordan Lloyd), by examination of the urine, and history. The lumbago area is nearer the centre of the column, and is usually lower down towards the sacrum. The muscles are tender on lateral pinching or pressure.

The diagnosis of pain experienced in the lower urinary organs must be arrived at by careful examination. All methods of search must be employed prior to the introduction of instruments. These must be reserved for the conclusion of the examination. The most prominent symptom should be first taken—hæmorrhage, frequency, alteration in stream—and the diagnosis worked out systematically on the lines laid down.

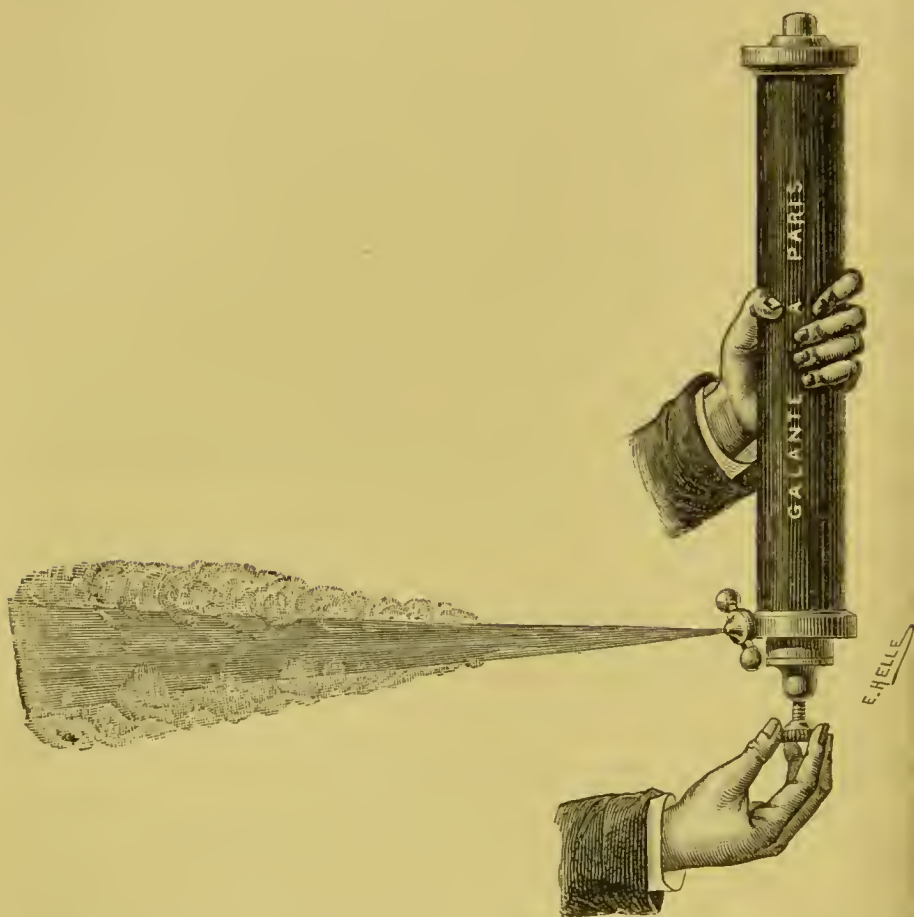
For the treatment of the pain of myalgic affections, or of rheumatic conditions of the fascia, I must refer you to your text-books. In the chronic types, which alone apply to me for treatment, in the belief that kidney stone is present,

* *Note on palpation of the kidney.*—"Israel's method of palpation is a very satisfactory one. A line parallel with the middle line of the abdomen is drawn from the middle of Poupart's ligament to the margin of the ribs. The finger-tips placed two finger-breadths below the margin of the ribs, and upon this line, are directly over the lower extremity of a kidney in place. In order to feel this kidney we must avoid poking with eager hooked fingers, or the abdominal muscles will contract in resentment. The tips of the straight extended fingers are placed upon the point indicated while the patient lies supine, with flexed legs, upon a hard bed or table. The other hand now lifts the loin gently towards the opposed fingers. At each expiration of the patient's breath the fingers upon the abdomen are pressed a little farther toward the kidney, and the impressions of touch kept well in mind. It is not long before the fingers easily recognise the object sought for. If the patient now takes a full breath, a wandering kidney will be forced from under the finger-tips, and in some cases it is forced entirely past them, as a grape pops out of its skin.

Guyon finds the kidney by approaching it as Israel does, and then by sharp pressure of the fingers in the loin causes spasmodic contraction of the quadratus lumborum muscle, and a consequent bumping of the kidney against the fingers upon the anterior abdominal wall."

I rely greatly on belladonna plasters, the action of the constant current—massage with a weak constant current (under 5 milliampères), and counter-irritants, such as a

FIG. 24.*



* Fig. 24 shows Messrs. Galante's instrument and its mode of working. This apparatus consists of a metallic tube enclosed in india rubber, having at its base a small aperture through which the chloride of methyl escapes in the form of spray. By a most ingenious arrangement the jet or spray can be started, stopped, or regulated with great facility, thus enabling the surgeon to keep a thorough control over it. The skin, as soon as it is touched by the chloride of methyl spray, becomes congealed, pale, and hard, and the patient feels a burning sensation resulting from the intense cold produced. When the application of the remedy has been of short duration the only change in the appearance of the skin is that it first becomes reddish and then brown, the latter colour remaining for several days. When the skin is covered with hair, this should be shaven before applying the spray. It is necessary to state that the spray should not be applied to one part of the skin for more than five seconds at a time, otherwise it will produce vesication or sloughing. Christy and Co., 25, Lime Street, is agent for England.

flannel belt with a sprinkling of flour of mustard worn next the skin, the application of Baumscheidt's needles round the site of the pain, not on it; or Corrigan's hammer or button. For private practice, the chloride of methyl spray (Fig. 24) is excellent. It is sprayed over the loins in a slanting manner, so that it merely glances over the skin. If a stronger effect is required the spray is concentrated for three seconds on to one spot. For drugs I employ iodide of potassium, Dover's powder, lithia, Jamaica dogwood, or opium, according to the character of the trouble. The compound elixir of *cimicifuga** (5j, t. d. s.) is worth a trial.

True renal pain.—It is wise in all cases to give belladonna. With the exception, however, of phosphatic or uratic irritation of the pelvis, medicinal treatment without sedatives will do but little good. The various natural waters recommended for calculus (Contrexville, Kronenquelle), or a combination of alkalies (p. 80, *b*), relieves renal pain in lithuria; and such vegetable infusions as *Stigmata Maidis*, *Collinsonia Canadensis*, *Ballota*, *Pichi Holarrhena*, are often of value as adjuncts. I should remind you that these infusions are apt to constipate, and much of your success in relieving renal pain depends on keeping the colonic flexures and rectum empty. Hot water rectal enemata are invaluable in relieving renal pain, and clearing the colon.

If pus is present sandal oil† is of use. A combination of belladonna, Chian turpentine, and aloes is often of real value in obscure renal pain. The older fashioned turpentine punch‡ is nauseous in the extreme, but often efficacious and acceptable in out-patient practice. In all cases of sudden acute renal pain you exhibit opium or morphia; or if there is evidence of acute renal disease you employ other sedatives, such as belladonna, hyoscyamus, Jamaica dogwood; hot baths, hot rectal enemata, hot fomentations and counter-irritants to the loins, such as mustard, turpentine, &c., being employed freely. Chloroform inhalation is of use, but a dangerous remedy for the patient to become habituated to.

* Black cohosh, *Actæa Racemosa*, black snake-root; each fluid ounce represents—

Cimicifuga, gr. xxx,
Liquorice root, gr. x,
Wild cherry, gr. viij,
Senega, gr. viij,
Ipecacuanha, gr. iv,

obtainable at Parke, Davis, and Co., Holborn Viaduct.

† Contra-indicated in acute nephritis.

‡ Turpentine 5j, whisky 3ij, Aqua ferv. Oss.

Operative Treatment.

Obstinate renal pain, with or without evidence of disease of the pelvis of the kidney, necessitates operative interference for its relief. If the urine is quite healthy, and the case has resisted all methods of treatment, I advise nephrotomy being performed, and the capsule of the kidney to be incised longitudinally. This is often followed by immediate relief. The mere examination of the front and back of the kidney with the finger is often sufficient to cure the pain. In many of these cases I suspect the pain is due either to mild ascending cysto-pyelitis or to backward renal tension from the intermittent kinking of the ureter of a mobile kidney.* In the former case the operation acts as a sharp counter-irritant, whilst in the latter inflammatory fixation of the kidney, or *inflammatory splinting of the acute insertion of its upper end into the renal pelvis, takes place, and a permanently open tube instead of an occasionally folded or kinked canal is thus created.*

CASE 79. *Constant left renal pain; left nephrotomy; relief; return of pain in opposite kidney; right nephrotomy; cure.*—H—, æt. 37, came to me in January, 1891, complaining of constant pain in the left testicle and left kidney. The pain was distinctly renal. It radiated down the thigh, and apparently followed a mild urethritis. After a year's trial of medicine I cut down upon the left kidney, resecting half an inch of the last dorsal nerve where it crossed my path. I found the kidney apparently healthy. The patient lost all his pain and returned to work. He came back to me six months after, requesting to have the right kidney operated upon, as the pain had attacked this side. He had never had any pain in the left side since the left nephrotomy. I cut down upon the right kidney, and examined it digitally. It appeared healthy. I did not puncture the capsule or resect the nerve. This completely relieved him of all pain, and apparently the cure is permanent.

I have never seen any harm follow the aseptic digital exploration of the kidney surface; in fact, usually benefit has accrued.

For the pain of pronounced cases of moveable kidney an

* Landau, of Berlin, maintains that spasm of the ureter alone is not enough to account for a largely distended renal sac, and points out how the ureter may be occluded by torsion or tension when the kidney is abnormally movable, or when pulled upon by prolapsed genitalia with cystocele, or when the ureter is inserted at a more acute angle than usual. Then the pelvis is distended until the pressure is sufficient to overcome the obstruction. With each attack it loses elasticity, and dilates gradually into a large sac, which drags the kidney downwards, thus aggravating the mechanical disadvantage of the contained fluid, for the ureter is inserted then at the top of the sac instead of at the bottom, and is also in greater measure pulled upon, twisted, or "kinked." Finally, neither the recumbent position nor manipulation may be able to effect evacuation, and the cyst becomes permanent and the kidney atrophies. ('Berl. klin. Woch.,' Nos. 47 and 48, 1888.)

appropriate bandage may be worn,* massage and faradism and prolonged rest tried; failing this nephrorrhaphy† should be performed.

Operative interference for the pain of other renal diseases, such as stone, hydronephrosis, pyonephrosis, renal abscess, perinephritis, tuberculosis, and carcinoma, have already been discussed under the sections of Hæmaturia and Frequency.

The Treatment of Pain in the Lower Urinary Tract.

Acute pain.—In acute inflammation rest must be insisted on. You employ fomentations, rectal enemata of hot water, a rectal “poultice,”‡ hot hip baths, free leeching round the anus or above the pubes. Suppositories of opium, or of morphia and belladonna, or subcutaneous injections of morphia over the bladder, opium by the mouth, or in conjunction with alkalies are administered according to the need for sedatives. The inflation of a little chloroform vapour into the rectum by a Junker’s inhaler is worth a trial. Compare “Cystitis,” p. 122; “Prostatitis,” p. 164.

For all reflex and local penile pains dependent on micturition, such as occur in the bracket on page 236, no treatment is so useful or so soothing as passing water when the penis is immersed in hot water. After every urination a hot sponge to the meatus in either sex is most soothing.

An injection of a 4 per cent. solution of cocaine often affords great relief. I invariably use a freshly made 20 per cent. solution, and in only one case in many hundreds have I seen any ill result. In the case I mention the solution was driven into a false passage, and was therefore practically a subcutaneous injection. The pain of chordee is best relieved by immersion in ice-cold water. I cannot say any of the vaunted drugs—belladonna, camphor conium, bromide of potassium, lupulin—are reliable for this form of pain.

Chronic pain.—To obtain success in relieving chronic pain of the lower tract, an accurate diagnosis must be made and the cause removed.

* I usually advise a well-fitting abdominal bandage adjusted with an air-cushion slipped underneath in the collapsed condition, and subsequently blown out so as to force the kidney into its bed and to keep it there.

† Dr. Keen has collected 134 cases of nephrorrhaphy; of these four died (2·9 per cent.).

‡ Those treated by suture involving the kidney substance were most successful; the failures were 13·5 per cent.

§ Liq. Opii Sedativ. mxxx, Hazelini ʒss, gruel ʒij, injected into rectum and retained.

I need not detail the various remedies for the pain of each disease, and only a few points need be made. In supra-pubic and perinæal pains due to chronic inflammation, the application of iodine, of croton-oil liniment, of methyl spray, or of an ointment of veratria and aconitia rubbed in until tingling is produced may be used with advantage. The opium of chronic prostatitis is ergotine. Bromides and cannabis indica by the mouth, and cocaine under the skin of the affected area are worth a trial. Constant currents passed from the perinæum to the pubes are of value.

Operative interference for pain in the lower urinary tract will depend largely upon the cause. Obstructive (muscular) pain is relieved by catheterisation or by removing the impediment; inflammatory pain by rest and sedatives (compare p. 122). Iodoform emulsion is the best mucous membrane local sedative we possess, cocaine being too evanescent in its action for long-continued use.

In many of the cases of pain which are unrelieved by drugs or local treatment the advisability of a perinæal cystotomy should be carefully considered. Many cases that baffle our best efforts are relieved by division or dilatation of the vesical orifice. The presence of hard carcinoma of the base of the bladder or prostate, or tubercle of the bladder or prostate is usually a contra-indication to perinæal cystotomy.

Untoward Effects of Instrumentation in Cases of Neurotic Prostate and Ano-vesical Pain of Ataxia.

It is so often impressed upon you that the occasional introduction of a large steel bougie into the bladder relieves the uneasiness and pain of a tender neurotic prostate, that I warn you that in some cases of neurotic prostates and in ano-vesical pain of tabes instrumentation not only does no good, but it is occasionally followed by bad results. In three cases of patients with definite symptoms of ataxia I have passed a black bougie to eliminate stricture, and in each case the patient's symptoms and pain have been greatly aggravated, and in one (Case 81) the spinal trouble has been much increased by my interference.

CASE 80. *Urethral pain; phosphaturia; commencing ataxia.*—G. C.—came to me complaining of pain when he made water. He had a little difficulty in starting his urine, but no frequency. His urine was densely phosphatic. He had been under the Victoria Park Hospital for his chest and dyspepsia. Two of his sisters had died of phthisis.

I noticed that he swayed whilst standing to have his urethra examined,

and I therefore tested and found both his knee-jerks were much increased, but no other symptoms of cord lesion were present. I passed a No. 24 French bougie in order to eliminate stricture. Twenty-four hours after the examination he began to feel unwell, and sent me word that "there was much pain in his stomach and chest, with shortness of breath, pain in the head and at the bottom of the back, trembling of limbs, staggering in walking. After sitting a short time he had some difficulty in starting to walk; urine was not passed so freely, it had become dark brown and thick." I at once wrote to him to call and see me, and I was astonished at the sudden change. He was ill, very weak, and reeled in his walk like a drunken man; his legs seemed, losing power like a case of acute myelitis. He had "fits of trembling" which lasted twenty minutes at a time, and great pains in his legs and belly. At this visit he stated that he had suffered severely about six months ago with frequent emissions at night, and often in the daytime when riding in a bus or train, without any cause or sensual thought or excitement, and without the slightest erection seminal fluid used to run from him. I at once referred him to a neurologist, feeling certain that I had unwittingly aggravated his symptoms by passing the instrument.

CASE 81.—N. C—, æt. 40, came to me complaining that for ten years the bladder "had not acted with proper freedom;" the water had flowed more especially feebly the last three years. Three years ago he had pain of a spasmodic character above the pubes, which forced him to go to stool and strain to pass water, often so severely as to bring blood from the rectum. He found if he took opium he was free from pain the entire day; he could also pass his urine comfortably, and the spasms were not nearly so bad. A year ago vesical irritability set in. His frequency of micturition, when under opium, was every two hours in the day, but without the drug it was every hour. At night he was only called once or twice. Nocturnal incontinence had occurred lately; this was aggravated if he took opium at night. I found him suffering from symptoms of ataxia, and passed a 16 French bougie very gently to eliminate stricture. Finding none, I admitted him here to be initiated into catheter life. A few hours after I had examined him the pain above the pubes increased greatly, so much so that he was unable to sleep. All the ataxial symptoms increased. He took to his bed, vomited continuously, complained of unceasing suffering, and I had to place him on full doses of opium in order to afford him any relief. There was no elevation of temperature; nothing pointed to urethral reaction. He died a week after admission from pure exhaustion. On post-mortem the bladder and prostate were apparently quite healthy; but strange to say there was a recent extravasation of blood beneath the capsule of the kidney! I regret to add that the pathologist did not examine the spinal cord.

I do not see how such an aggravation of the symptoms can be avoided. It is difficult to account for the sudden increase of all the symptoms by the gentle passage of a bougie through the deep urethra. It is certainly unusual for this to occur, for the catheter is a necessity in locomotor ataxy, and it does not often induce symptoms. Slight fever induced by urethral resentment would affect the spinal trouble and increase the sclerosis; but in neither of my three cases was there any fever present. These cases lead us insensibly to the subject of

reflex spinal neuroses, and to inquire how far reflex paralysis might not be caused by urinary disease.

Reflex Spinal Neuroses and Reflex Paralysis (Paraplegia Urinaria).*

It is still held by some authorities that grave disturbances influencing the entire nervous system are dependent on some form of peripheral irritation, such as a simple erosion of the os uteri.† The genito-urinary tract is no exception to this rule; indeed, according to American authors, it is a prolific field for reflex neuroses. The history of the question is interesting.

In 1833 Stanley read a paper before the Medico-Chirurgical Society on the "Irritation of the Spinal Cord and its Nerves in connection with Disease of the Kidney," basing his argument upon the theories of reflex action which were being eagerly discussed at that time. Most of the cited cases, examined by the light of our knowledge of the present day, are worthless; but one case, which certainly reads like the one I have just given you, is worth repeating,‡ although its value is greatly diminished by the absence of microscopical examination of the spinal cord.

A male, æt. 22, was admitted into St. Bartholomew's Hospital with retention, the consequence of a suddenly arrested gonorrhœa. The bladder then lost its expulsive power. The sphincter ani became paralytic, and he lost in some degree the power of moving his lower limbs. He also complained of severe pain at the fifth lumbar vertebra. His lower limbs became remarkably flabby, and after a time the loss of power in them was complete as far as motion was concerned, and nearly so in reference to sensation, for when firmly pinched he could only feel it in the upper parts of the thighs; incontinence followed, then suppression, and he died.

The kidneys were in a state of acute suppurative nephritis. The infundibula and pelves were filled with pus mixed with a thick ropy mucus. No morbid appearance was discoverable in any part of the brain or spinal cord.

After Stanley came many who corroborated his views: Rayer, Henoch and Romberg, Holland and Groves, Notta, Leroy d'Etiolles, Esnault, Landry, Macario.§ Many instances

* An excellent lecture on this subject will be found in New Sydenham Society's Volume lxi, by Prof. Leyden.

† Dr. Chamberlain mentions a case where a reflex irritation set up by a deep fissure of the anus had given rise to symptoms of well-marked sclerosis of the anterior columns of the cord, and which on division of the sphincter were almost immediately and completely relieved. (Discussion on Dr. Sayre's paper, 'Trans. American Medical Assoc.,' vol. xxi, 1870.)

‡ Stanley, 'Med.-Chir. Trans.,' vol. xviii, p. 214, 1833.

§ Landon Carter Gray, 'Annals of Anatomy and Surgery,' January, 1882.

of "reflex paralysis," seemingly caused by genito-urinary disease, were recorded. The theory held its ground for years, but it was suddenly opposed by Sir W. Gull in a masterly manner.* The tide then set in the opposite direction, and many denounced it. We now know for certain that many of the cases recorded in favour of Stanley's theory were illustrations of urinary disease *secondary* to spinal cord affections, but it is wise to pause before we pronounce spinal disturbances secondary to urinary affections to be impossible. Sound evidence has been collected which points to the possibility of *functional reflex disturbances*.

Before touching on this difficult question I will give you instances from reliable authorities. The facts are undoubtedly honestly reported, but whether the interpretation of these facts is correct is quite another matter.

Reflex Spinal Irritation from Preputial Troubles (Balanitis).

Dr. Brown-Sequard related the following case to Dr. Otis :—
 "A gentleman was brought to me who presented all the rational signs of advanced cerebral *ramollissement*. I had looked upon the case as quite a hopeless one until noticing that the patient frequently applied his hand in an absent sort of way to his genital apparatus, upon which I examined the parts, and found an aggravated inflammatory phimosi complicated with acute balanitis. On making this discovery I expressed to the medical gentleman accompanying the patient my belief of the possibility that the *apparent ramollissement* might be due to reflex irritation, caused by the evidently chronic and severe irritation of the glans penis. I advised circumcision, which was done, and so rapid was his recovery that within six weeks he presented himself perfectly well in every respect."

Dr. Lewis Sayre† reports various cases of paralysis or contracture of the lower extremities, consequent upon adherent phimosi and balanitis. One little boy of five was unable to walk without assistance or stand erect, his knees being flexed about the angle of 45°. A fortnight after circumcision he could walk alone, with his limbs quite straight.

Dr. Bridges‡ has also recorded a very remarkable case :

J. F—, æt. 34, Irish, unmarried, of nervous temperament,

* 'Med.-Chir. Trans.,' 1856; 'Guy's Hosp. Reports,' 1861.

† 'Trans. of the American Medical Assoc.,' vol. xxi, 1870, p. 203.

‡ 'Med. Record,' New York, May 7th, 1892, p. 576.

had never been ill until his present trouble began four years before. In 1881 he contracted gonorrhœa. In 1888 he began to experience tremors of the muscles of the forearms and hands, particularly noticeable when those members were extended. Very soon his legs became affected in the same way, and on attempting to walk he seemed to lose control over the moving leg, which rendered his gait unsteady. He became staggering and gave up work. The annoyance intensified his nervousness and tremors, and his trouble was frequently attributed to chronic alcoholism. He noticed increasing difficulty in passing urine; the size and force of his stream lessened. There was also much diminution in sexual desire, and erections occurred but seldom, although frequent seminal emissions* had troubled him for four years.

On consulting Dr. Bridges he was noted as being "tall and thin, and extremely nervous; when attempting to speak, his words came out in a jerky irregular way, and on extending either arm or leg violent tremors would occur. If such efforts were persisted in there was apparent loss of power over co-ordination, and he staggered along like a drunken man. He was unable to stand with his eyes closed and the feet in apposition. The reflexes were much exaggerated, particularly the patellar. There was no anæsthesia, no eye symptoms, no muscular atrophy or paralysis. A long foreskin, which occasioned him much annoyance from retained secretion, was removed without any improvement in his symptoms. His urethra was examined. He had a contracted meatus and two strictures in the penile urethra, which admitted nothing larger than 13 French sound. The strictures were divided, and the meatus enlarged until 20 English sound could be passed. Immediate improvement to his urinary difficulty ensued, and within a week he was decidedly less nervous; he had some control over the muscular tremor, and there was a marked change in his gait. In a month's time he could stand with his feet in apposition and the eyes closed, the body swaying only a little after a number of minutes. In two months he could walk with steadiness, the muscular tremor

* I would ask you to note this fact especially, that in many of such cases the patient is of a decided "nervous" excitable character, and that heavy seminal losses are complained of. The continual drain of this fluid is able in many weakly neurotic men to give rise by itself to very remarkable functional disorders, *e.g.* ocular hyperæsthesia as mentioned by Mr. Hutelinson, "which is quite analogous to spinal irritation, irritable ovary, irritable testes, irritable prostate, coecæx, sphincter ani, and bladder." (Hutelinson, 'Med. Times and Gazette,' June 21st, 1879.)

had almost disappeared, the knee-jerk was only slightly exaggerated, there was a return of virile power, and his nightly emissions had been much less frequent."

"*See-saw*" movement of the testicles for three years, due to stricture.—Otis details a case of a man aged 35, who after checking a gonorrhœal discharge with a powerful quack injection, began to suffer neuralgic pains in the left testicle; the scrotum became red and tender, the testicles moved up and down alternately, and the penis was greatly contracted. There was likewise pain in the groin, described as drawing and sickening, which extended down into his knees and bottoms of his feet. The meatus was found contracted, and 28 French solid steel was passed without relief. Dr. Otis subsequently discovered strictures at half an inch, two inches, and two and a half inches. These were freely divided, and as the patient emerged from the influence of the ether the cremasters, which before the anæsthesia were contracting rhythmically were now at rest.

He records a number of cases presenting features more or less grave, but a condition of significant interest was present in all, viz. an abnormal contraction at or near the meatus urinarius. He points out that spasmodic muscular action played a prominent part in every case.

The intimate association of ano-vesical cord centres* was well illustrated lately in Talbot Ward, under the care of my colleague Mr. Tay, in the case of a man who, after an operation for hæmorrhoids, had immediate, complete, and permanent ano-vesical paralysis. In dealing with this subject it will be as well to draw your attention to

Reflex Secretory Neuroses.

Reflex secretory neuroses are to my mind of especial interest and importance, because of the very prominent part which they play in operative surgery. I have already alluded briefly to the apparent control over the renal function exercised by the ureter (p. 229). Thus in semi-blocks of the ureter the secretion from the corresponding kidney is less abundant. You might meet this by saying physiology points to backward pressure as being the great regulator of the rapidity of secretion, for in proportion as the straight, collecting and excretory tubes are distended with unexpelled urine, so they

* Mr. Hutchinson draws attention to this case in the 'Lancet,' May 18th, 1889, p. 975.

will press more and more upon the contiguous vessels, and reduce the blood-supply to the Malpighian tufts.

I would submit, that I have more than once seen a kidney, the corresponding ureter of which was partially obstructed, doing very little work, though no backward pressure was being exerted upon it, and I have noticed that its fellow-gland was doing extra duty (Case 74). Again, it is a well-known fact in renal surgery, putting aside cases of general shock, that a kidney will sympathise with its fellow-gland which has been suddenly blocked or operated upon, and in consequence will secrete but little urine for some hours.*

Lastly, in some cases of moveable kidney I have had under observation, and in impacted ureteral stone without occlusion, the urine before operation has been very small in amount—eight ounces to ten ounces a day. The source of irritation was removed by stitching the kidney in its place, or by nephrectomy. After the operation the amount of urine secreted rose to nearly the normal. (Compare case, p. 213.)

The Reflex Effect of Vesico-urethral Examinations upon the Secreting Power of the Kidney.

The chief danger in catheterisation, dilating stricture, sounding bladder for stone, performing litholapaxy, or removing tumours of the bladder or prostate, consists in the kidney becoming extremely congested, and suppression or nephritis ensuing. The importance, then, of ascertaining if the kidney can be congested, or if the renal secretion can be reflexly arrested by instrumentation cannot be over-estimated.

What effects has instrumentation upon a normal kidney?

Tuffier† has answered this question by the following experiments. A healthy dog was chloroformed and curarised, the kidney was exposed and slipped into a Roy's oncometer, and the oncograph adjusted to the revolving drum, in order that any changes in the volume of the gland could be recorded, and hence that a record of the changes in the vascular supply of the kidney could be obtained. The following results were noticed.

Traumatism.

1. When the bladder was pinched between the finger and thumb and tightly pulled, the renal tracing immediately increased in depth, not losing, however, its regular character—

* Compare Israel's case, p. 271.

† 'Du rôle de la congestion dans les voies,' p. 23, 1885.

that is, the kidney was flooded with blood. Contact of the vesical mucous membrane with a sound produced no renal change.

2. Pinching the mucous membrane with forceps caused the renal tracing to change rapidly. "Two seconds after the pinching the line rose abruptly and irregularly, to descend after ten pulsations to remount again, and this time all the more irregularly." If the pressure on the bladder was maintained the tracing regained a certain amount of regularity, but never perfectly returned to the normal. These phenomena were more marked when the stimulation was directed against the collum vesicæ.

Distension of the bladder.

1. A feeble distension of two ounces did not influence the renal tracing.

2. But on augmenting the distension the tracing commenced to become deeper in its markings.

3. If 10 ounces were rapidly thrown in, so that the bladder was well distended, the tracing rose abruptly and sharply.

Conclusions.—1. Excitation by contact with the vesical mucous membrane, as in gentle sounding, does not influence the renal circulation.

2. Dragging, pinching, munching of the mucous membrane act as reflex excitants, and the kidney becomes flooded.

3. Over-distension, as may occur in litholapaxy, acts in a similar fashion, causing flooding of the kidney.

Comment upon Reflex Neuroses.

Functional disturbances.—I have not met with such extreme cases as I have quoted from Brown-Sequard, Otis, and others. I am, however, quite prepared to admit, from my own but less striking experience, that peripheral irritation may produce *functional* nerve disturbances in the young, the highly neurotic, the malarious, and in the sexually exhausted or depraved.

It is certain, moreover, that the reflex excitability* of

* Ample evidence of reflex excitation can be obtained in every part of the urinary tract. We may instance the effects of moveable kidney upon the entire intestinal tract (gastro-enteric catarrh).

The reflex effects of renal stone, such as vomiting, gastrodynia, cardiac palpitation, testicular numbness or coldness.

Or, again, the numbness of the thighs, the cutaneous hyperæsthesia of the

parts of the urinary tract, the prostatic urethra especially, can be exalted by persistent irritation to a remarkable degree, and that spurious or mimetic forms of spinal disease (spinal irritation) may be evoked.

Again, it is evident, clinically and experimentally, that reflex secretory neuroses are easily excited by irritation of any portion of the mucous membrane of the urinary tract.

Organic spinal disease.—I doubt whether organic spinal changes, and therefore permanent paresis, can ensue as a reflex consequence of peripheral irritation, though evidence is to hand to point to the extension to the cord from *inflamed* urinary areas by a travelling neuritis, and the production in this manner of paraplegia urinaria.

Leyden* says, "In many of the cases of 'paraplegia urinaria' an anatomical affection of the cord can be proved in the form of myelitis, which begins in a circumscribed lesion of the upper part of the lumbar enlargement. From this, and from the symptoms of lumbo-sacral neuritis which not infrequently precede, it appears probable that the inflammation of the bladder first passes to the nerves, and induces there a progressive neuritis. The experiment of Tiesler† shows that this may lead to myelitis. This may, therefore, be looked upon as the most natural and frequent mode of occurrence of paraplegia urinaria. It is not yet determined whether in addition an actual reflex paralysis does occur, and this is in no way contradicted by physiological and experimental facts."

belly, nates, or legs, and the pain in the back, arms, shoulders, neck, head, outer side of tendines Achilles, in morbid conditions of the urethra, notably in membrano-prostatic catarrh and granular erosions of the penile urethra.

Or, again, the sickness, faintness, and syncope on the first introduction of a urethral instrument; and lastly, the occasional but immediate rigor during urethral instrumentation.

* 'On Reflex Paralysis.'

† Tiesler, 'On Neuritis,' Königsberg, 1869, p. 25. In his experiments on neuritis the sciatic of the dog and rabbit was irritated in various ways. In one of these experiments the rabbit became paraplegic, and died in three days. On examination there was found a collection of pus at the place where the nerve had been irritated, and a similar lesion within the spinal canal exactly at the spot where the root of this sciatic enters the spinal cord. The cord was much softened at this part, and contained pus corpuscles and fat granules. The nerve-trunk between the two collections of pus showed nothing abnormal. This observation is an experimental proof of the fact that a local neuritis may induce an acute myelitis with complete paraplegia. (Quoted from Leyden, New Sydenham Society, vol. lxxvi, p. 163.)

SECTION VIII.

ABNORMAL URINATION—ALTERATIONS IN THE CHARACTER OF THE STREAM OF URINE (EFFLUX)—SUPPRESSION—RETENTION— INCONTINENCE.

So much can be learnt by watching the act of urination that it is unwise to neglect this item of examination. It is also better not to trust to the description of the size and strength of the stream which is so often volunteered by the patient himself. It is useless for me to describe the characters of the normal stream of urine, you are only too familiar with them; but it is perhaps as well to remind you that the veriest trifles may mislead you if you examine the efflux carelessly.

The stream may be narrowed by partially unbuttoned trousers pressing on the penis, or by a small urethral orifice, congenital or acquired. The efflux may be broken at the meatus, and rendered bifid, flattened or twisted by inflammatory thickening of the lips, or by their being caked and gummed together by glutinous urethral discharge. The velocity may be checked by a redundant prepuce or by a pin-hole phimosis.

The stream may be rendered feeble and intermittent in continuity by pure nervousness;* and lastly, the patient may have lately emptied his bladder, and the stream be weak because there is no "head" of water to create velocity. By watching the patient's face and naked belly as the stream of urine is being ejected, you are able to reckon roughly the amount of assistance the patient derives from his diaphragm and abdominal muscles in urination. Again, an opportunity is also afforded you of learning the position usually assumed by the patient in micturition. Some with calculus can pass water best when lying on their backs. Those with floating vesical growth often lie upon their side. Tabetic patients sometimes squat, as if at stool. Stricture patients often lean

* I have mirrors so arranged that I am able to watch the patient's stream without his knowledge.

forward. One case of acute myelitis, to which I have referred, lay prone upon his belly (Case 30), and so on. Although no position is pathognomonic of any form of urinary disease, yet a ready hint is often gleaned whilst watching the patient's manœuvres.

Our subject consists of abnormal urination, impossible urination, and uncontrollable urination.

It will be convenient to tabulate those conditions which cause an alteration in the normal stream as follows :

1. Alterations in volume of the stream (size of efflux).
2. Alterations in continuity of the stream (interruption of efflux).
3. Alterations in the direction of the stream (changes in the parabola).

A few words only are necessary to comment upon these divisions, for this table will be a sufficient reminder of such deviations from the normal.

Abnormal urination	Alterations in the volume of the stream (size of efflux); (compare retention)	(a) Sense of obstruction developing suddenly	Gonorrhœa. Acute prostatitis. Impaction of stone in urethra. Congested senile prostate.
		(b) Sense of obstruction developing gradually	Onanitic prostate. Chronic prostatitis. Stricture. Chronic lesions of spinal cord. Stone in the bladder. Orificial valves of mucous membrane. Stone in urethra. Senile enlargement of prostate. Pelvic tumours.
	Alterations in the continuity of the stream (interrup- tion of efflux)	(c) Efflux arrested suddenly	Stone, clot, pedunculated growth, foreign body. Spasm.
		(d) Efflux arrested intermittently	Atony, muscular or nervous. Muscular enfeeblement of fever or old age. Stricture.
	Alterations in the direction of the stream (the para- bola)	Stream bifid	
		Stream vertical	Enlarged prostate.

1. *Alterations in Volume of the Stream.*

Diminution in the size of the stream depends on one of two groups of causes—obstruction to the outflow, or loss of expulsive power—the *vis a tergo*. Patients are rarely able to discriminate between the two. Any decrease in the size of the stream is supposed by them to be due to “stricture,” for a sense of obstruction or increased difficulty in urination is experienced as well in muscle innervation as in impediment, and a sense of obstruction is synonymous in a patient’s mind with this well-known disease.

Sudden diminution.—The sense of obstruction may develop suddenly or gradually. In the former, any inflammatory swelling of the canal (urethritis or prostatitis) is usually obvious by visual or rectal examination. In impacted stone in the urethra in the adult there is always a history of recent renal colic. It is rare, unless stricture or a narrow meatus pre-exists, for a stone to become impacted in the earlier attacks of renal colic, for the urethra will generally permit the transit of a calculus which has passed the ureter. When the ureter has become dilated and the calculi larger, and the urethra narrowed by the cicatrization of the injury of a previous transit, impaction may ensue and obstruction to the stream suddenly take place. Usually the adult urethra expands at the sides of the irregular calculus to allow of some stream, but if the stone be round retention may result. Retention from stone impaction is commoner, from anatomical reasons, in the child than in the adult.

Gradual diminution.—When the stream has diminished *pari passu* as the obstruction has increased, the impediment will most often be found to be due to stricture of the urethra. I must warn you, however, that a prostate swollen by masturbation, or enlarged and thickened by inflammation, simulates the early stages of stricture very closely, and it is not at all uncommon for patients to be “dilated” and “cured” of stricture who have merely had an onanitic prostate, or the relic of a subacute prostatitis.

Onanitic (prostatic) obstruction to the stream.—There is no doubt that while, in some cases, masturbation induces frequency of micturition (p. 150), in others it causes a sense of obstruction to the stream and a diminished volume. This obstruction may even induce serious atony (Case 58, p. 164).

Concerning the actual prostatic change—whether it be due to loss of support to the wall of the urethra from atrophy, or due to narrowing of the canal from swelling of the lobes—I am unable to speak positively. In several cases I suspected the impediment was an overgrowth of the verumontanum, which proved on urethroscopy to be inordinately enlarged. In others it appeared to be weakened vesical muscle; in others again it was due to distinct enlargement of the gland, for only steel instruments could be passed.

Chronic prostatitis.—Chronic inflammation of the prostate not only causes a retardation of the stream, but evokes also a corresponding feeling of obstruction. In some cases it leads to the development of a train of peculiar but characteristic symptoms. Thus the latent period is unduly prolonged, the stream is difficult to start, the jet is smaller, the flow tedious, and the bladder difficult to empty. In this stage the trouble is often diagnosed to be “*strictural*.” After a little while, especially in cold damp weather, vesical irritability appears in the day. There is no pain on micturition, simply straining and frequency. This second stage is due to the accumulation of an ounce or more of residual urine. The difficulty in micturition increases. *It is worst on rising in the morning.* Some cannot pass water at all until ten or eleven o’clock. As the day passes the stream improves. The morning difficulty may increase until absolute retention ensues, but this is only in aggravated cases, as is also the occurrence of piles and prolapse of the rectum. The patient is usually better with exercise, and in the summer. The frequency of micturition and obstruction is worse after taking wine, after an error in diet, or after exposure to east winds, cold, or wet. As the case progresses, pain is experienced deep in the perinæum; it is of a dull, aching, prostatic character. It can only be described as a “gnaw.” Often this pain recurs towards 5, 6, or 7 o’clock in the evening in those who have had malaria, or have been in malarious districts. The pain is at first relievable by sandal oil or a hot bidet (sitz bath). Mucus and phosphates now appear in the urine, as a result of the decomposition of the ounce or more of residual urine. The surface of the trigone is inflamed and puffy by extension from the subjacent prostatic inflammation. This may infect the entire bladder; flushes of prostato-cystitis accentuate the suffering, and keep the small pool of residual urine perpetually stagnant and putrescent. The character of the residuum deteriorates still more, it keeps alive the irritability and strain-

ing, and causes the swelling of the mucous membrane to become chronic. A vicious circle is thus created, which must be broken before a cure can be effected.

Nothing relieves this form of obstruction so well as the daily irrigation of the neck and body of the bladder with nitrate of silver* (gr. j ad ʒiv to ʒviii, page 149). Often in a short time the gnawing pain disappears, the obstruction ceases, and the frequency of micturition subsides.

Atony.—But chronic prostatitis is not the only obstructive urethral disease which is so often diagnosed as stricture. The mistake is frequently made in the earlier stages of locomotor ataxia, and other partial and chronic lesions of the spinal cord.

Although most patients with bladder troubles depending on chronic spinal cord disease consult you about nocturnal incontinence (p. 303), yet some, in whom the nerve destruction is slight or very gradual, complain first of narrowing of the stream and a difficulty in urination, and if you do not notice the swaying gait of inco-ordination which is invariably present you may be inclined to diagnose stricture, and treat the case accordingly.†

The following interesting example of partial loss of vesical power with obstructed stream resulting from spina bifida occulta came under my notice not long ago. It illustrates also the versatile character of a weakened bladder muscle.

CASE 82.—C. P.—is aged 22. You notice as he crosses the floor that his heels clank, and that he walks stiffly as if in orthopædic irons. He will tell you that he has had talipes, and has been tenotomised, and is still wearing supports. He has, moreover, suffered lately from a typical perforating ulcer of the foot, but it has healed under appropriate treatment.

He came to me complaining that, from the age of fourteen, he has had a difficulty in making water on getting up in the morning. Sometimes this amounts to absolute retention, lasting the entire day. At other times he urinates in a small stream, passing only a little at a time, and that frequently. At other times again he cannot hold his urine when the call comes. If he does not go at once the urine shoots out into his trousers.

Latterly these symptoms have become worse, and superadded, there has been an aching pain across the lower belly, which is tender on pressure. There was no stricture, but on stripping him to examine the back a spina bifida occulta was discovered, and the reason for the talipes and

* The pain from the silver nitrate varies greatly in different patients.

† I may remind those of you who believe themselves adepts in passing instruments that such false diagnoses of stricture are *very common*, even with men in large practice and with average manual dexterity. To avoid this error you should always use a *bougie à boule* in diagnosing stricture.

perforating ulcer was at once apparent.* He had no knee-jerks; the anal sphincter was patulous, but he had control over his motions unless he suffered from diarrhœa. The stream varied in size from a thick jet to a dribble; the urine was clear and healthy. I found he had 4 oz. residual, and with the systematic withdrawal of this by means of a catheter and the exhibition of nux vomica he was relieved of his symptoms, and could dispense with the instrument. His atony and the symptoms it induced are only relieved, not cured. I do not doubt that if he has a fall on his buttocks or back, if he runs down in health or gets some form of fever like influenza, all the trouble will recur in an aggravated form.

The age is a rough but ready guide to the cause in these cases of obstructed stream. Thus before 25 years of age it is often onanitic; 25 to 35, strictural; 35 to 45, tabetic; from 49 to 55 it is due to a senile prostatic obstruction.

Differential diagnosis.—I usually examine the urine; if it is clear and the patient young I examine the rectum, and eliminate the prostatic factor. I then test the knee-jerks and the co-ordination, and finally examine the urethra with a *bougie à boule*.

Rare Causes of Obstructed Outflow.

Valves of œdematous mucous membrane at the orifice of the bladder.—In dealing with the subject of obstructed stream I must draw your attention to a condition with which I have become familiar by the use of the cystoscope. It is unmentioned in the literature, and of its exact causation I cannot as yet speak decidedly. I refer to large succulent folds of swollen mucous membrane which overlie and obstruct the urethral orifice of the bladder. I have frequently seen the mucous membrane surrounding this opening corrugated, or pleated into folds of greater or lesser thickness and succulency. At first I supposed this ridge and furrow appearance denoted folds produced by an insufficient distension of the bladder, and that they were therefore analogous to those *rugæ* visible on the posterior wall in the semi-contracted viscus. But I soon found they were *permanent* folds, for they remained in every degree of moderate distension, and they occurred also in those parts where the mucous membrane is more firmly attached than in other parts, *e. g.* trigone, and around the vesical orifice. I soon encountered a patient who had all the sym-

* I may remind you that such complications are often present in true spina bifida, and usually indicate that the spinal cord or the nerves coming from it are involved in the sac. In the "*occulta*" form, where no sac exists, but the ununited laminæ of the sacral vertebra can be felt, and the skin over the deficiency is covered with an abnormal growth of hair, such complications are, I believe, less usual.

ptoms of stone in the bladder, who had been treated for it and sounded many times without result. On cystoscopy I found no stone, only obstructing œdematous folds of mucous membrane.

CASE 83.*—Mr. C. A. B—, under the care of Dr. Bull, of Chislehurst, related his case to me as follows :—“Five years ago pain came on in the side like the stitch. This was followed by pains in the penis on commencing and finishing passing water. I was then sounded, with a negative result. I was recommended to St. George's, and was there again sounded under ether, and remained there six weeks. I returned home and went back to work (builder's foreman) for twelve months, when one day I was seized with an attack of retention. After a drink of gin, and much straining and great pain at the tip of the penis, I succeeded in relieving myself. For some time after this the pain in the penis was very severe on commencing and finishing making water. I then consulted Dr. Bull, who, after relieving me somewhat, sent me to Guy's Hospital. I remained there about a month, and was sounded for stone with negative result. Since this time I have had several stoppages, and I was always passing water at short intervals night and day to get a little relief. I was provided with a catheter, which I now always carry with me in case of stoppages.”

Dr. Bull kindly referred the patient to me in October, 1888. It will be seen that, with the exception of the absence of blood, all the symptoms characteristic of stone were present. There was slight renal pain, followed subsequently by pain in making and finishing water, repeated stoppages and strainings to overcome some obstacle, with increasing frequency. Prostate free, no stone in substance.

On entering the bladder with the electric cystoscope I was struck with the great œdema of the mucous membrane at the base and around the urethral orifice. The whole surface of the trigone was raised into white gelatinous projections like foetal finger-tips placed side by side. No stone or growth existed. Upon what did this œdema depend? I was unable to say, but, practically, he had an œdematous obstruction at the orifice of the urethra, which interfered with micturition and generated symptoms of stone. Under appropriate treatment he rapidly recovered, and wrote under date November 27th, 1888, “Feel very well; quite free from pain.” I have heard on and off since that the attacks have recurred.

Writing under date May 14th, 1889, he says, “I have been very unwell again; on Thursday last I was seized with cold shivers and pains in the back, side, head, testicles, and penis. I passed water every half-hour in the day and every two hours in the night, the colour of the urine being dark.”

In January, 1892, the patient writes saying, “I do not keep so well as I like. At times I suffer pains and have to urinate fifteen times in the day, and six times at night. About two months ago I had another attack of retention.”

In January, 1893, “Occasionally an attack of retention.”

In thinking over this case it struck me that the probable cause for this œdematous frill around the vesical orifice was made up of two factors: one, a sliding of the mucous membrane from inflammatory loosening of the submucous attachments—in other words, a prolapse; and the other an œdema

* This is Case 6, p. 104, ‘Electric Illumination of the Bladder and Urethra,’ 2nd edit.

from obstructed venous return. After some delay I was confirmed in my opinion by the case now in Cotton Ward.

CASE 84.—A. W—, æt. 47, was sent me by Surgeon-Major Keogh to crush for calculus. He had only had symptoms for eight months. He did not strike me as being in much distress. He passed water ten or twelve times a day, but not at night, and complained most of straining and difficulty in micturition and occasional hæmaturia. He had voided two or three small, pea-sized, phosphatic calculi. The prostate was small and dense.

His history is this:—He has been in India, and has had malaria or ague. In April, 1891, he found he could not pass his water well. He had cold shivers and ague. He then passed fine gravel, like crystallised caraway-centred sweets, and had to strain greatly to get them away. The most difficulty was when he got up in the morning. The stream was better on moving about. The urine was very thick, and smelt badly. The stream never suddenly stopped unless it was cut off by a bit of gravel, whereupon blood appeared, of a bright red. Bleeding was not worst after walking. There was only blood when the stones came away.

I performed litholapaxy, crushing a small, soft, phosphatic calculus. There was some difficulty in the operation, both in the introduction of instruments, which seemed to be caught at the neck of the bladder, and in the management of the last fragment, which repeatedly eluded my lithotrite, and which I finally lost. Residual urine was present to a large amount. An unusual degree of pain followed the operation, and I was forced to examine him again in the theatre for the piece of calculus I felt I had left unerushed. I had again the same difficulty in the introduction of the lithotrite, but succeeded in evacuating the fragment. He was discharged, and in a few weeks he again returned, *never having lost the symptoms of stone*. My notes record that “the hæmaturia is more profuse; bright scarlet urine is passed; the frequency is every hour day and night. There is great pain at the end of the penis after micturition, much straining, only a small quantity being passed at a time. I feel certain I have left a fragment which has become impacted in the prostatic urethra. He is infinitely worse rather than cured by the litholapaxy.” I examined him under ether, but could find no trace of a stone.

In a few weeks the man again returned. His lips were pallid, his face of an earthy hue; he was emaciated, irritable in temper, sleepless, exhausted, and suffering terribly after the act of micturition in the glans penis; now and again the pain would shoot into the rectum. He was urinating every hour day and night, a wine-glass at a time and straining agonisingly to evacuate even this small quantity. Whenever he walked about at all he bled furiously. The urine was thick, full of muco-pus and phosphatic *débris*, and contained, after filtration, half albumen. Supra-pubically and to the right a hard tumour could be felt. It was evidently a displaced bladder, for it bulged visibly forward when the bladder was full, and lessened considerably on emptying the viscus with a catheter. Under these circumstances I advised perineal drainage to ascertain the exact condition of the bladder, for he was too ill to employ vesical irrigation, and instrumentation was too difficult for cystoscopy.

Operation.—I first attempted to wash the bladder out with an ordinary black catheter, but failed; a silver catheter passed after hitching at the orifice. After perineal section I proceeded to explore the bladder with my finger, but although the prostatic canal was not unduly lengthened I

did not seem to be able to enter the bladder. Supra-pubic cystotomy was, therefore, done. On introducing my finger through the latter route I found myself in a contracted bladder; neither grit, nor stone, nor tumour could be discovered anywhere. On examining the left side of the bladder my forefinger slipped into a diverticular sac, the size of an orange. It was smooth and empty. On searching for the urethral orifice I encountered what I took at first to be a patch of soft succulent fibro-papilloma, like miniature cabbages. They encircled the entire urethral orifice. Careful examination proved this condition to be a swollen gelatinous collar of soft, very moveable mucous membrane, polypoid here, flattened there. Had there been any hardness I should have diagnosed a fibro-myomatous collar of the enlarged prostate. It felt like a ring of large, soft, lax, external piles, fringing the urethral opening. My house surgeon, Mr. Claude Hawkes, inserted his finger through the perineal opening to meet my own. I felt the tip of his finger after pushing away these folds, which intervened between us. I treated these folds as external piles, cutting the polypoid pieces off and freeing the orifice thoroughly. He is now draining well and free from pain; the urine is clear, but his renal condition makes me doubtful of the future.*

It would seem that my riddle read thus:—swelling of the mucous membrane of the orifice first produced obstruction; this œdema may have resulted from an overlooked transient subacute prostatitis, or it may have been induced by renal changes. The straining to evacuate the bladder had produced a dislocation or prolapse of the mucous membrane towards the orifice, just as a similar result has been known to ensue in the ureter† and in the female child's bladder. The increasing obstruction of the urethral orifice induced an accumulation of residual urine, diverticular pouching of the left wall, cystitis, and the formation of phosphatic stone. The subvilloid papillomatous growth‡ had been probably produced by the constant irritation of residual urine.

This and other cases (cystoscopic and autopsial) make me inclined to think that too little attention is paid to *swelling of the mucous membrane* at the vesical orifice.

In many the cause of the œdema seems to be due to subacute inflammatory conditions of the underlying prostatic tissue. Those who come under medical advice early enough can be relieved by irrigations or instillations of nitrate

* Sequel of case:—This patient subsequently had several profuse attacks of hæmorrhage through the supra-pubic tubes; he got weaker and died. On post-mortem two or three small lappets, which I had left for fear of contraction, fringed the orifice; they resembled shrunken external anal piles exactly. The entire mucous membrane of the bladder was velvety and subvilloid. The prostate was healthy. The kidneys were large and white.

† "Prolapse of Ureter," Davies-Colley, 'Pathol. Trans.,' xxx, 1879, p. 310; Caillé, 'Intern. Journ. Med. Science,' May, 1888, p. 481.

‡ I have recorded a precisely similar subvilloid bladder, 'Pathol. Trans.,' xxxvii, p. 312, 1886.

of silver (p. 149), according as to whether the body or the neck only of the bladder is affected.

It is to be remembered that a positive diagnosis, and therefore appropriate treatment, can only be given in the initial stages of the complaint by means of electric cystoscopy.

Pressure of a bladder pouch upon the female urethra causing increasing obstruction.—An instance of this very rare form of obstruction came under my observation not long ago.

CASE 85.—Mrs. J. B—, æt. 42, was admitted in a moribund condition under my colleague, Mr. Heycock, to whom I am indebted for permission to publish the history. She suffered from urgent desire to urinate, but experienced great difficulty in getting rid of the urine. Aggravated cystitis was present, but no stone. There were 7 oz. of residual urine. The more the patient strained the less freely the urine passed. A tense chestnut-sized swelling was detected to the right of the urethra, on the anterior wall of the vagina. The patient died, and on post-mortem a diverticulum from the right side of the base of the bladder was found to have insinuated itself between the vagina and the commencement of the urethra, occluding the inner end of that canal. The bladder was large, its walls were greatly thickened; the mucous membrane was discoloured by chronic cystitis. Both kidneys were in a state of acute suppurative nephritis. The left ureter was very large. Obviously, in proportion as the patient had strained to pass urine, so the herniated sac had filled, and had pressed more and more upon the urethral channel. I have never seen so simple or so effective or so automatic a current regulator before.

Stones in the urethra.—I place before you without comment these large stones* which I have removed from urethræ. The impediment that they offered to the stream must have been great; in fact, in all the cases the stream was vertical. Two are larger than my forefinger, and weigh over an ounce each. The duration of their residence in the canal is uncertain, probably over seven years in each instance.

Pelvic tumours.—Pressure may be exerted by various tumours upon the prostatic urethra, and cause obstructed stream and finally retention.

Thus in all soft malignant growth of the prostate there is great obstruction to the stream (p. 191). In hydatid sacs situated low down in the pelvis between the rectum and the prostate, pressure is similarly exerted and obstruction ensues (31 per cent. of pelvic hydatid); † Carcinoma of the urethra (Case 9, p. 11) or Sarcoma of the corpora cavernosa or capsule of the crus penis‡ of course produces the same effect.

* Author, 'Path. Trans.,' pl. ix, vol. xli, p. 188, 1890.

† Compare Author, "Hydatid Sac in Pelvis," 'Pathol. Trans.,' vol. xlii, p. 209, 1891; *ibid.*, xxxvii, 317.

‡ Author, 'Pathol. Trans.,' vol. xli, p. 193, 1890.

2. Alterations in Continuity.

The stream is arrested abruptly and involuntarily.—The sudden arrest of the stream in mid-course is supposed to be pathognomonic of stone. I must remind you that though smaller stones are able to be caught up by the outflowing urine and to block or cork the urethral orifice of the bladder, the symptom is rarer than is supposed.* Moreover the same symptom is evoked by the impact of a moderate-sized blood-clot, a thick clump of muco-pus, a villous growth swinging on a long pedicle, a loose necrotic piece of growth, an hydatid cyst, or a small foreign body impinging against the urethral orifice during micturition. There is this difference, however, between these bodies: the harder the body, the greater the pain in the glans penis after the act and the longer it remains before subsiding.

I may here pause to mention the peculiar stream of obstructing pedicled villous growth.

CASE 86.—A. E—, æt. 34. I saw this patient micturate 14 oz. The urine at first came in a full, strong stream, finishing after a few ounces with a sudden check, and then a dribble—not the abrupt arrest of stone, but like tea percolating through an accumulation of tea leaves in the spout of the teapot. After this sluggish stream had ceased, the patient, by an effort of his abdominal muscles and diaphragm, started afresh, with the repetition of the characters just mentioned—strong stream, check, dribble. On examination with the light a broad-based, long-pedicled, villous growth was seen floating from the left lateral wall. It was long enough to reach over the orifice and form a fleshy filter for the urine.

Voluntary arrest.—The patient sometimes shuts off the stream voluntarily by means of his constrictor urethræ, “the shut-off muscle,” before he has quite emptied his bladder, in order to escape the pain which he knows by experience is evoked by the complete emptying of the viscus. In these cases there is a localised general acute cystitis or a tubercular catarrhal ulceration. Ascertain, then, by cross-examination, whether the sudden stoppage is voluntary or involuntary. I have already pointed out that the symptoms of acute localised cystitis and stone are very much alike.

The stream is arrested intermittently.—The stream of urine is interrupted several times during its flow. The patient starts, and after a feeblish but a parabolic flow the

* “Of a dozen cases now in the wards only one had this symptom.”—Guyon’ ‘Leçon clinique, Voies urinaires,’ p. 328.

stream dies down. Abdominal pressure is exerted, and the stream reappears, but only to again dwindle and disappear. This intermittent current, which may be repeated several times, is the index to the feebleness of the vesical muscle. It is most often noticed in atony of enlarged prostate or tabes, but I have seen it in all forms of vesical paresis—in that secondary to peritonitis,* to fever (typhoid), to influenza, to forced over-distension; in the atony of cord lesions, of stricture, of floating and corking villous growth, and of enlarged prostate. It is a very useful hint that the vesical power is impaired. An intermittent current always betokens *partial paresis*, but it does not follow that residual urine is necessarily present, for the bladder is often able to empty itself by its repeated efforts.

3. *Alteration in the Parabola.*

Alteration in the normal parabola is most often seen in obstructed urethra. It is, however, important for you to remember that a twisted stream does not necessarily denote the existence of stricture of the urethra—although a bifid stream certainly points to an urethral impediment, whether it be prostatic, membranous, or penile. The vertical dripping stream is usually stricture. The vertical *full* stream shows the current is broken by an irregular, prostatic canal (senile) which allows the current to pass but breaks its force.

Extra-urinary Effects of Obstructed Stream.

Remote effects of retarded and difficult micturition are to be seen in the increase in the size of hernial protrusions (Fig. 18), or in their actual formation. Prolapse of the rectum with the formation of piles is also common. I have made the post-mortem of two patients who had extensive cerebral apoplexy with urinary obstruction.† You will often remark how atheromatous the vessels are, especially the basal arteries of the brain, in cases where the due elimination of renal salts has been long prevented by urethral blockage. This arterial degeneration is an additional incentive to remove any obstruction to the free outflow of the urine as soon as possible, for not

* After inflamed conditions of the mucous membrane or peritoneal surface of the bladder the stream is diminished because the muscles have partaken of the inflammatory condition, and have not yet recovered (Stokes's law).

† Cf. Author, 'Path. Trans.,' vol. xxxvii, p. 300.

only are the vessels weakened, but extra stress is also placed upon them by the decided obstruction to the circulation which violent expiratory efforts invariably produce. Mr. Harrison* mentions that he has known an internal aneurism to burst and cause death in two cases of great urinary obstruction; and adds, "Whether the chronic straining had anything to do with the production of the aneurisms or favoured their rupture is a matter for speculation." I have met with older patients who have habitually neglected their stricture, who have complained of pins and needles in the hands, numbness, twitching, and occasional attacks resembling *petit mal*. These symptoms most likely are due not to reflex neuroses of urethral origin, but to definite atheromatous arterial change. They resemble the symptoms noticed in early cerebral disease consequent upon syphilitic arteritis.

Treatment of Retarded Stream.

If the cause of the retardation of the stream be loss of muscle power, much can be done by the exhibition for long periods of muscle tonics, such as *nux vomica*, *strychnia*, *ergot*, *hydrastis canadensis*. I have tried faradic currents extensively, and with the exception of the atonies of nervous origin they usually are of value. In the male they should be weak at first, or intractable orchitis may result. The method I employ is that recommended by Mr. Denton Cardew. A soft Jacques catheter is fitted with an ebonite end, Fig. 25, which

FIG. 25.



comprises a tap and a screw terminal, the latter being in connection with a two-inch wire which lies within the outer end of the catheter. This is passed into the bladder, the tap being shut. The screw being in connection with one terminal of the faradic battery, and the other terminal being affixed to a flat electrode which is placed upon the supra-pubic region, the tap is opened, and as the urine runs *slowly* off, the battery is set

* Harrison, 'Urinary Organs,' p. 38.

in action. A faradic current is thus conducted into the bladder by means of the issuing stream of urine, and thrown directly on to the internal vesical wall.

In retardation of the stream from obstruction due to inflammatory swelling of the mucous membrane, great relief can often be afforded by irrigation of the neck and body of the bladder by means of nitrate of silver solution, gr. j ad ʒviiij (p. 149). In other forms of obstruction instrumental or operative interference is necessary.

Impossible Urination.

The stream may be altogether absent, and no urine may be passed, either from suppression or from retention. In the former case there is rarely any pain or distress. The patient is depressed, listless, drowsy, the pulse is hard, the skin hot and dry; vomiting is often present. There is no vesical distension (as estimated by percussion and bimanual examination), and the catheter proves the bladder to be empty. With retention there is great tensive pain, situated in the hypogastrium. There is also tenderness and swelling of the lower belly, flatness on percussion in the region of the distended bladder, which may sometimes be noticed bulging under the abdominal wall as high as the umbilicus.

The patient is in great anxiety and distress of mind, and makes futile efforts to urinate. There is no fever.

Impossible urination (no urine passed)	Supres- sion of urine	Non-obstructive	Renal disease.
			Shock.
	Obstructive		Septicæmia.
			Hysteria.
			Reflex causes.
			Injury to one kidney.
	Reten- tion of urine	Peritonitis.	Ureteral obstruction.
		Fevers.	
		Pressure on bladder neck	Rectal collections.
			Pelvic growths; hydatids.
			Soft malignant prostatic growth.
			Acute prostatitis.
	Urethral obstruction		Congested stricture.
			Impacted stone in children.
	Reflex spasmodic action		Ruptured urethra.
			Anal and hernial operations, &c.
	Nerve lesions		Acute myelitis.
			Tabes (7 per cent.).

Suppression.

Most of the cases of non-obstructive suppression you will encounter in practice will be due to renal disease, either as a symptom of the onset of the complaint or of its termination. Occasionally you will observe transient suppression in concussion or blows upon the head, in cases of poisoning,* and in sporadic and true cholera.† I doubt if you will meet with hysterical suppression.‡ I have once encountered it in a female patient of Professor Charcot's.§

CASE 87.—I was summoned late one night to see a French lady, æt. 29, who was said to have passed no urine for three days. She had been persistently watched by her husband and a nurse. She was said to have had a similar attack of anuria in Paris, where, after an attack of hæmorrhage from the lung and stomach she had suppression of urine for three weeks. I found a healthy, well-built young woman, with a cool skin, a clean moist tongue, and full pulse. I was shown some blood the patient had spat up, but I noticed the tonsils were raw and abraded. The lungs were, moreover, healthy. On introducing a catheter I withdrew two ounces of high-coloured, non-albuminous urine. Learning that there had been some domestic friction, and that the same symptoms had been previously noticed and had also been entirely recovered from, I ordered a sharp diuretic and a strong counter-irritant to both loins. This was effectual in cutting short the attack. Still I have no doubt that suppression of an hysterical character was present, for the husband watched by day and the nurse by night, and all the body linen was periodically examined and changed to make certain that the urine was not passed into the clothes. Concerning the statement that the patient had passed no water for three weeks whilst in Paris, there is every reason to believe that systematic deception had been indulged in.

Septic suppression.—In some cases of supra-pubic and perineal cystotomy or rough litholapaxy, acute cellulitis may travel along the course of the ureters from the inflamed pelvic cellular tissue, and acute suppression may result.

Reflex Suppression.||

From reno-renal reflex (inter-renal sympathy).—Guyon and Tuffier have remarked on the sudden suppression of urine

* "Corrosive sublimate has more often than any other poison been followed by this symptom."—Dickinson.

† In most of the cases of cholera noted in our post-mortem books the bladder is described as "firmly contracted and empty."

‡ Compare Laycock, 'Nervous Diseases of Women,' 1840.

§ Charcot, 'Diseases of the Nervous System,' New Syd. Soc., vol. i.

|| The whole subject is well considered by Dr. Reinhard Caspar, "Reflex Lähmung der Nieren," 'Wiener Klinik,' March, 1892.

from a healthy kidney by reno-renal reflex consequent upon injury to the fellow-gland.

That a nervous reflex suppression of the action of one kidney, dependent upon a mechanical irritation on the other, really exists, is clearly demonstrated by a case recorded by James Israel, of Berlin. A man *æt.* 49, who had been suffering for years from gout and right renal colic, was suddenly seized on November 15th, 1886, with left renal colic; on November 16th total suppression of urine supervened. On November 21st a lumbar incision was made on the left side. A stone was found in the pelvis of the kidney, entering and occluding the ureter; it was extracted. A second stone was impacted in the ureter 10 cm. lower down. It was pushed up into the renal pelvis with two fingers from the outside of the ureteral canal, and then extracted through the same wound. Both kidneys at once resumed their work, as could be proved by the different result of qualitative analysis of that urine which passed the bladder and that which was discharged through the wound.

Fürbringer has also commented upon a case of suppression and death from reflex action arising from the sudden blockage of one ureter.

From vesico-prostatic reflex.—I have already alluded to the oncometric work of Tuffier (p. 259), which demonstrates how readily the kidney can become reflexly flooded on the receipt of injury to the lower urinary organs. It is now time to draw your attention to the clinical side of the question, and to place before you facts which will impress you with the necessity for caution, care, and all possible gentleness in instrumentation.

CASE 88.—Not long ago a particularly easy, straightforward case of villous growth of the bladder came under my care. The patient was young (*æt.* 32) and healthy, the urine showed that it was being secreted under backward pressure, but it contained no albumen. With the exception that atony (10 oz.) existed from corkage of the urethral orifice by the floating growth, the case could not have been more favorable for removal. I ablated the tumour supra-pubically, cleanly and without hæmorrhage. I inserted a supra-pubic and an *urethral* drain (the latter being a Jacques catheter). When the patient awoke from the ether he informed me that three days before the operation he had had a sharp attack of Russian influenza. I was alarmed, for a year previously I had lost a case of vesical growth during the epidemic. There was, however, no reaction. The urine drained away plentifully; it was clear and normal. The temperature remained low. Forty-eight hours after the operation the patient complained that the catheter made the urethra very sore, so I withdrew it. In doing so I was sensible of a slight resistance, but on the exertion of a little traction the Jacques

came out. Its eye-end was covered with pus, and its removal caused the patient intense but momentary prostatic pain. I had hardly left the room before symptoms of acute suppression of urine ensued. The temperature rose without a rigor to 101° , and fell again immediately. Uncontrollable vomiting of bile set in. In sixteen hours I found him much altered. The face was drawn, the skin cold, and he complained of pain in the belly. There was tenderness over the right ureter, which increased as the day advanced. Everything that could be done to control the vomiting and combat the suppression was useless. He died twenty-four hours after the removal of the catheter. How far the influenzic poison was a factor in the fatal outcome I do not know. I believe that it had some influence, but the jerking removal of the catheter leaving an open surface for absorption was the real cause of the suppression. I have several times drained the urethra by catheter with the best results, and do not wish to condemn it, for I have not met with any other untoward result. I only use the case for the sake of the acute suppression, and point out to you at the same time the danger of a posterior urethritis adding a fresh burden for an already taxed kidney to bear.

But it is not only in cases of urethral inflammation and septicity that fatal suppression ensues. You will now and again meet with it after catheterism, and curiously enough in patients habituated to the catheter. Sir W. Roberts alludes to a case in which death by suppression followed catheterism twenty hours after instrumentation in an old case of stricture which had been repeatedly dilated. The only post-mortem appearance of consequence was intense congestion of the kidneys.

Sir H. Thompson mentions a case in which a man with old-standing narrow stricture died fifty-four hours after the passage of an instrument, which had been used at least a hundred times before. Rigors and vomiting commenced an hour after catheterisation, and not another ounce of urine was secreted from that time until death. No damage whatsoever was found to have been inflicted upon the urethra. The kidneys were congested to an extraordinary degree.*

CASE 89.—Not long ago one of my colleagues performed internal urethrotomy upon a sailor who had suffered severely from African coast fever (a species of malaria). There was no reaction, bougies were subsequently passed, and all seemed to be doing well. Just before the patient left the hospital the house surgeon thought he would pass an instrument. Immediate and fatal suppression ensued, and the man was dead in twenty-four hours. No post-mortem was allowed.

I cannot help believing in these cases of sudden suppression that all the essentials for the catastrophe have been present

* Sir W. Roberts, 'On Urinary Disease,' p. 29; compare Mitchell Banks, 'Ed. Med. Journal,' June, 1871.

but latent, and that the fatal climax is suddenly reached by some extra severe nerve stimulation, which causes reflex flooding of the kidney. Probably the renal vessels have often been distended before, but have recovered themselves, though their nervous control has become each time more and more unstable. The final blow paralyses the local vaso-motor function reflexly, the vessels are over-distended and cannot empty themselves, epithelium necrosis ensues, filtration ceases, the process of secretion proper, *i. e.* by which the urea and the principal urinary solids are eliminated, is checked, and total suppression is the result.

Obstructive Suppression.

The commonest cause of obstructive suppression is the sudden blockage of the ureter by a stone or clot* in patients who only possess one working gland. It not infrequently happens in these cases that on post-mortem one kidney will be found absent, disabled or useless, the disease which has produced this renal impairment having been marked by few if any signs. This loss of one kidney is especially noticeable in children, in whom the sufferings from a stone impacted in the ureter are often misinterpreted. It occurs also in localised latent tuberculosis. The fellow-kidney takes on a double share of the work, and all may go well until a sudden renal colic from stone impaction ushers in complete suppression. This accident will be of more frequent occurrence as nephrectomy is more freely practised. The literature of calculous suppression has already been enriched by such cases, but its monotonous fatality has also been lately relieved by the record of the brilliant and successful removal of the stone (p. 277).

But many other causes for obstructive suppression exist, such as throttling of both the lower ends of the ureters by vesical carcinoma, by gumma,† by uterine carcinoma, by pelvic growths, and by hydatid cysts between the posterior wall of the bladder and the brim of the true pelvis. A good example of the last-named cause was in Talbot Ward under my care not long ago.‡

* The patient shown in October, 1891 (Case 1, p. 5), has just died of acute suppression from the sudden plugging of the ureter of the sound kidney with clot (?).

† Dr. W. B. Hadden, 'Pathol. Soc. Trans.,' vol. xxxvii, p. 301.

‡ Quoted in 'Pathol. Soc. Trans.,' vol. xlii, p. 201.

CASE 90.—On September 14th, 1890, I was sent for to see a case of suppression of urine by Mr. Robert Debenham. The patient, a young man of twenty, was greatly emaciated and in a grave state of exhaustion; sordes were on his lips, tongue, and teeth, and he spoke with difficulty and in a whisper. There was no supra-pubic distension, and no distress to urinate. On the right of the pubes a firm fleshy mass could be felt. This I took to be the contracted bladder shoved up by rectal distension, for it was similar to the contour of the empty bladder when it is thrust up by the Braune-Garson method. On passing a catheter there was a hitch at the prostate, but it entered easily, no urine was evacuated, and it was withdrawn without even a drop of water in the eye. The finger was therefore inserted into the rectum to ascertain the cause of the obstructive suppression. It encountered an elastic semi-fluctuant mass, which did not spring from the prostate, but was obviously in the recto-vesical pouch. Bimanually this mass was found to be in intimate connection with the fleshy, contracted, dislocated bladder above the pubes. Many small, shotty perirectal glands could be felt between the mass and the rectal wall. I did not know whether I was dealing with a soft sarcoma or with a hydatid, and the history did not throw much light upon this question. For some years the patient had had frequency of micturition in the daytime, and had had to get up twice at night to empty his bladder; but he had never seen any blood, and his water had always appeared healthy. He had been suffering from headache and sickness since Christmas, 1889, the headache ceasing two months before admission, but the sickness continuing up to the present time, and generally coming on the first thing on rising. These symptoms suggested that an insidious interstitial nephritis due to compression of the ureters had been progressing for some months. A month ago he felt so weak that he could not work, and was obliged to remain in bed. Last Monday night, September 9th, he was awakened by a severe cramp beginning in the thighs and extending up to the lower part of the belly. This was continuous for twelve hours. On Thursday, September 12th, these cramps began again, and since that time he has passed no urine. I saw him September 14th. The ordinary remedies were exhibited, but without effect, and next day, September 15th, I determined to aspirate the tumour through the rectum. Before doing so, however, I inserted a catheter, but failed to draw off any urine, though the instrument was introduced to the hilt. I therefore thrust the aspirator into the tumour through the rectum, and drew off some few ounces (3—4) of clear fluid, evidently from a hydatid cyst. I immediately passed a catheter, and evacuated two ounces of blood-stained urine. Obviously by reducing the bulk of the pelvic hydatid I had enabled the ureters to empty their dammed-up contents into the bladder. The patient felt much relieved, and the next day, Monday, he passed voluntarily 30 oz. of urine. I thereupon proposed to perform a supra-pubic cystotomy, lift up the peritoncum from off the upper surface of the cyst, open it, and evacuate its contents. I hoped thus permanently to relieve the pressure upon the ureters, for I was certain, from the small amount of fluid that I had withdrawn from the cyst by aspiration, that it was mostly filled with secondary cysts. On Wednesday morning early, the day fixed for the operation, the urine suddenly stopped, and at 8 a.m., whilst he was being supported on the night stool, he dropped back dead.

Post-mortem (the same day).—Body much emaciated. No distension of abdomen. Above the pubes, and somewhat to the right, was a slight projection formed by the bladder pushed upwards by the pelvic tumour. On opening the abdomen the intestines were found empty; the liver was

healthy, and contained no hydatid cyst; the other solid viscera were healthy. On removing the intestines the kidneys were seen to be very large, but on cutting into them they were found to be mere sacs, with thin cortices and enormously dilated pelvises. Each ureter was dilated to the size of a child's small intestine, and both these conducting tubes were full of urine. As the ureters turned over the pelvic brim they were compressed by the hydatid sac, and from this point to the bladder these canals were of normal size and contained no urine. Rising out of the true pelvis was a large, tense, milk-white hydatid cyst, which completely filled that cavity, and by fully engaging its brim, nipped both ureters and the rectum at that level. The bladder was also dislocated upwards and to the right. Its upper half contained a couple of ounces of urine, for it was rather compressed into an hour-glass shape against the edge of the pubes, the lower and empty compartment being flattened against the posterior surface of the pubes.

Certain features are common to most cases of obstructive suppression; thus there is always a small amount of pale urine secreted, of a low specific gravity, during the few days which elapse before death or recovery. The amount passed or evacuated is variable—a few ounces one day, more the next. Symptoms of constitutional resentment are usually delayed. Neither the patient nor his friends realise the danger at first. The first symptom of the effects of suppression is usually vomiting, and when once this has begun other signs rapidly show themselves, such as muscular twitching, profuse sweats, increasing drowsiness, contraction of the pupil, and laboured breathing, and the case rapidly closes. The mind in pure obstructive cases, *i.e.* those which are uncomplicated by sepsis, is remarkably clear to the very end, the final *coup* resulting from cardiac failure. The duration of the case in obstructive suppression is also much longer than in septic suppression—seven days as against three days.

Treatment of Suppression.

A fair proportion of non-obstructive cases will yield to the hot water or hot air bath (p. 74). Counter-irritants to the loins (dry cupping, mustard and linseed poultices); large hot water rectal enemata, followed by ʒij of the infusion of digitalis thrown into the emptied rectum; jaborandi or pilocarpine injected under the skin, and free exhibition of diluents if the patient is not vomiting, should be tried. If these measures do not relieve, it will become a question whether it is not wiser to cut down upon both kidneys and release the tension by incising the capsule.

In the obstructive type, when the patient has had a previous nephrectomy, or in which a definite attack of renal colic pre-

cedes the suppression, a fair trial should be given to the remedies mentioned above; and if these fail nephrotomy should be performed upon the side in which the pain is felt, and the pelvis of the kidney opened. There is no question as to the surgery of this undertaking; it finds its analogue in perinæal section for the retention from impassable stricture.

No cases could illustrate more forcibly the after risk of nephrectomy, or the value of surgical interference in total suppression due to calculous blockage, than the two following.

On January 3rd, 1882, Bardenheuer,* of Cologne, opened a pyonephrosis of the left side of an unmarried lady 27 years of age, by the lumbar incision. The abscess was closing up, and patient doing well; only a very small amount of clear urine was voided through the wound. On February 8th, the thirty-sixth day after the operation, a sudden chill with total suppression of urine set in. The catheter found in the bladder only some mucus and a small stone. Pain in the back and the right lumbar region, running down towards the bladder, was complained of; nausea and fever. On the following day the high fever, pain, and absolute anuria continued; patient had twice vomited some greenish mucus. February 9th, operation: lumbar incision on the right side, with an additional transverse cut at its lower end which ran backward. The kidney was shelled out of its adipose capsule. When this had been done anteriorly the finger reached the pelvis of the kidney and the upper end of the ureter. A small stone could be felt in the latter, which by palpation suddenly slipped back into the pelvis of the kidney. At the same moment a stream of urine was expelled through the urethra. The communication between kidney and bladder had been re-established. The stone was now pressed back with two fingers of the left hand into the ureter, the latter incised with a knife, and a smooth longitudinal concretment of the size of a bean extracted. Four more small stones were removed from the renal pelvis. The wound in the ureter was closed by three silk sutures, and the large wound loosely packed with antiseptic gauze. Soon afterwards the urine made its way through the wound. On the fourth day after the operation chill and recurrent anuria. Under narcosis the upper portion of the ureter was bluntly loosened for some distance, divided, and fastened in the lumbar wound. On March 12th the patient was without fever and slowly recovering.

Mr. Clement Lucas showed a patient at the Royal Medical and Chirurgical Society in 1890 upon whom he had performed nephrotomy for suppression.

A woman æt. 42 came under his care in June, 1885. She had suffered from hæmaturia for seventeen years, with pain on the right side of the abdomen; and for seven years a tumour had been palpable on that side, and recognised to be the kidney. This was removed by lumbar incision in June, 1885, and found to be completely disorganised and filled with calculi. For three months she remained well, and then, towards the end of October in the same year, she was suddenly seized one evening with

* O. Thelen, "Nephrolithotomie wegen Anurie," 'Centralblatt für Chirurgie,' 1882, No. 12, quoted by Willy Meyer.

violent and agonising pain in the back and left loin. She passed a little urine soon after, but none subsequently; vomiting set in in about half an hour. The vomiting and anuria continued, and on the fifth day from the onset of pain she had become drowsy and weaker, so that it was difficult to get her to answer questions. The pulse was weak, and the temperature 99°. Ether being given, Mr. Lucas cut down on the left kidney, and discovered a conical stone acting as a ball valve to the top of the ureter. It was three quarters of an inch in length, and from three to five eighths of an inch in diameter. Urine began to drop away out of the wound as soon as the kidney was opened, but the pelvis was not much dilated. For twelve days all the urine came through the wound; then an ounce and a half was passed from the bladder with much pain, and the quantity gradually increased, until a week later all was passed by the urethra. The wound did well, and was completely healed in ten weeks. The patient has since enjoyed good health for a period of five years.

The literature* now contains several convincing and successful cases illustrating this procedure, and demonstrating very clearly that the danger consists not in cutting down upon the kidney, but in hesitation.

Retention of Urine.

Retention of urine is so familiar a symptom that I need touch but lightly upon its causation, and shall therefore confine most of my remarks to its appropriate treatment.

Retention of urine	Cerebro-spinal injury.	
	Shock.	
	Fevers.	
	Neighbouring inflammation	{ Peritonitis. Perinephritis. Pelvic abscess. Ischio-rectal abscess.
	Pressure on bladder neck	{ Uterine displacements, &c. Rectal collections. Pelvic growths. Vesico-anal hydatids. Soft malignant growths of prostate. Acute prostatitis.
	Urethral obstruction	{ Congested stricture. Impacted stone in children. Ruptured urethra. Enlarged senile prostate.
	Reflex spasmodic action	{ Aural operations. Radical cure of hernia, hydrocele, varicocele. Acute myelitis.
	Nerve lesions	{ Tabes (7 per cent.).

* Dr. Kirkham, of Downing Market ('Lancet,' March 16th, 1889), one of the most brilliantly successful cases on record; Mr. Godlee, 'Clinical Soc. Trans.,' vol. xxii, p. 155; Lange, "Two Cases of Renal Surgery," 'Medical News,' 1886, p. 69; Willy Meyer, 'Annals of Surgery,' April, 1892.

In all falls upon or injuries to the head and spine, retention should be guarded against, for such accidents may abolish the contractile power of the vesical muscle even without a fracture of the bony casing of the cerebro-spinal system being present.

Retention of urine from shock is of common occurrence, but the localised pain of the patient quickly draws attention to the distension. In some cases of shot wounds near the abdomen it may mislead a careless practitioner in the following manner.

CASE 91.—This young fellow of twenty-two, whose left lower thorax you see is perforated behind and in front by two large gaping wounds, through which the air gurgles and whistles as he breathes, was brought into Mellish Ward not long ago in a state of collapse. Being a volunteer, he was entrusted with a rifle, which he loaded with suicidal intentions, and with ill-conceived ingenuity discharged it into the region of his heart. The ball apparently passed through the left lower lobe of the lung, missing the heart, but smashing the fifth rib in front and the ninth rib behind. The hæmorrhage was very profuse; the blood poured out from both wounds, and was churned into a scarlet froth by the air which passed freely through the apertures (tranmatopncea). My friend Dr. J. C. H. Dickinson applied pressure to both orifices by means of pads of lint, and sent him on to the hospital. Soon after admission he began to suffer severe abdominal pain, which nothing relieved. The house surgeon, believing that the bullet had perforated the left convexity of the diaphragm, and had passed through or wounded the stomach in its course, sent for me to perform laparotomy, in order to cleanse the peritoneal cavity of blood, and stitch up the diaphragm and stomach if they were found wounded. You will see by this plate* of a frozen section of the body, taken at a level of the lower part of the sternum and fifth costal cartilage, how the bullet might have traversed the lung, diaphragm, liver (left lobe), diaphragm, and lung, and in this particular case I thought that this route had most likely been followed by the bullet. I noticed, however, that the extreme pain which the patient complained of was supra-pubic in position, and on percussion I found the bladder greatly distended. A catheter was passed with immediate relief of all the abdominal symptoms. The retention, which had caused the abdominal distress, was the result of shock and hæmorrhage. The diaphragm had probably escaped.

Fevers.

In specific fevers, notably typhoid and Russian influenza, there is a tendency to painless retention. This is partly due to the direct effect of the high fever upon the muscle, and to the vesical anæsthesia which may result from grave disturbance of the nerve centres. It should, therefore, be a rule without exception that, in the daily visit to a typhoid case, inquiries should be made concerning the act of micturition, and the hand should be passed over the supra-pubic region to ascertain if any distension of the bladder is present.

* Wilhelm Braune, 'Atlas of Topographical Anatomy,' Tab. xiii.

Neighbouring Inflammations.

The bladder is also sensibly affected by inflammation of contiguous surfaces. Thus in acute peritonitis* the vesical muscles often become paretic, and retention ensues. The pain and the distension of the bladder is masked by the same symptoms inseparable from the disease.

But it is not only in inflammation of structures so closely applied to the bladder that retention ensues. I have seen it in many other and contiguous inflammations; such as in perinephritis, periostitis of the concavity of the sacrum, ischio-rectal abscess, and other diseases. Of this complication in these diseases you have recently seen good examples in my wards. Thus, as an example of perinephritis with retention,† which is a rare complication I believe in this disease, I will give the following.

CASE 92.—B. G—, æt. 21, was admitted into the Jews' Ward as a case of retention, in a very emaciated and feeble condition. He stated that six weeks before admission, being at the time in perfect health, he suddenly felt a pain in the left side, and began to experience *difficulty in voiding his urine, with pain at the end of the penis during micturition*. There was no venereal disease or blow to account for the symptoms. Retention ensued; it was relieved in the routine manner, and as it recurred and became bothersome to the practitioner he was sent here. On admission he complained so much of his side that it was examined, and a large perinephric abscess was detected. The kidney was found pressed forwards. The urine was acid, 1020, and contained a trace of albumen. I opened the abscess through the loin, evacuating a pint or more of pus; no urine escaped subsequently, and his vesical symptoms disappeared. He got rapidly well. Doubtless the peri-ureteral cellular tissue conveyed a flush of inflammation directly to the bladder. Congestion of the vesical neck and retention were thus produced. I carefully eliminated all urinary source of this inflammation.

CASE 93. *Periostitis of the concavity of the sacrum, causing retention.*—A patient æt. 41 applied to me with retention; he had been relieved for the last three days by catheter. A soft catheter entered after a slight resistance at the neck of the bladder, and 28 oz. of deeply bile-stained urine were withdrawn. On examining the rectum to ascertain the cause of the retention I discovered a swelling which was narrowing the gut. It was situated nearly as high as my forefinger could reach. The tumour was elastic, and obviously an abscess springing from the front of the base of the sacrum. He refused to remain in the hospital, and on returning the next

* This is an extended application of Stokes's law that smooth muscle-fibre planes beneath an inflamed mucous membrane lose more or less of their tonicity and contractility.

† Retention is, as far as my experience goes, a rare complication of perinephritis. In twenty-six cases analysed by Dr. Duffin two only suffered from vesical irritation. Constipation is often remarked in these cases; perhaps this is another instance of Stokes's law.

day the abscess burst into the rectum. The day after this he was able to urinate voluntarily. The patient now consented to be admitted, and he remained for months in Talbot Ward. The abscess had pocketed in all directions, and free incision and drainage were required. I lost sight of him eventually.

CASE 94.—J. S—, æt. 44, came with a large ischio-rectal abscess of nine days' formation, and with a retention of thirty-six hours' duration. I drew off 25 oz. of high-coloured urine, sp. gr. 1024, acid, no albumen. The abscess was opened, but the catheter was needed for three more days; he then regained vesical power.

Pressure on the Neck of the Bladder.

We now pass from indirect influence to direct pressure. Of the displacement of the pregnant uterus I need not speak, though I may mention that in twenty cases recorded in the literature a retroversion of the gravid uterus has caused severe vesical distension, and as a consequence the mucous lining of the bladder has exfoliated, and was subsequently expelled as a thin-walled membranous sac* encrusting the phosphates. If the patient recovered, it was at the expense of a contracted bladder.

It is necessary, however, to remind you of the influence of rectal distension upon the bladder. You are familiar enough with the effect of Petersen's rectal bag in raising the bladder for supra-pubic lithotomy, but the influence of habitual distension of the rectum with fæces upon the bladder is hardly realised.

CASE 95. *Enormous distension of the rectum with wheat; retention.*†—In 1879 an edentulous old woman was admitted here with retention. The catheter was passed with difficulty; neither vagina nor rectum could be entered by the finger. On more careful examination a few wheat grains were dislodged from the anus, and for three days it was my duty to evacuate by means of a lithotomy scoop and enemata solid compressed clumps of wheat. A very large amount was removed; every grain had its husk intact. As the rectal pressure was relieved the power of urination was regained. The patient, it was learnt, had appeased her hunger by swallowing the wheat, which her edentulous jaws could not masticate and her atonic gut could not expel.

* My late friend and teacher, Mr. Maunder, published in 'Pathol. Trans.,' vol. xiii, p. 150, an excellent example of this result of retroversion; the history he gives is typical, and the description of the specimen characteristic. The complication had been recognised by Lever and Gull, but the gentlemen to whom it was referred to examine reported that it was probably a bullock's bladder!

† Compare similar case by Mr. George Todd, 'Lancet,' April 19th, 1845, in which retention of urine was produced by a collection of grey peas in the rectum.

Pelvic growths.—I can bring a long list of pelvic growths to illustrate the effects of the pressure they cause upon the bladder, but this case is sufficient.

CASE 96.—Not long ago I admitted this man, who is fifty years of age, into my wards for colotomy, and with a diagnosis of sarcoma of the pelvic fascia. He came complaining of difficulty in expelling his fæces and retention.

On examining him *per rectum* my finger could hardly ascend the passage. It encountered a large mass which apparently sprang from the right side of the pelvis; the finger had to coast round it to the left. The bladder was also dislocated to the left; the tumour was fixed, firm and elastic in consistency. I had not encountered such a condition before unless it was a pelvic or prostatic growth. I explained the necessity of colotomy, but before doing the operation he was placed on potassium iodide, as there was a history of syphilis. To my surprise this enormous swelling gradually disappeared, his rectal and vesical obstruction subsided, and if you examine him now you will only detect a confused thickening on the right side. I am unable to explain to you the nature of the case; probably it was gummatous.

Hydatid cysts.—As you are aware, hydatid sacs are not infrequently found situated between the bladder and rectum (7·9 per cent. of all hydatid cases—Davaine). In the male the chief stress of the pressure caused by the increasing bulk of the tumour falls upon the most moveable viscus in the pelvis—the bladder; and it is quite remarkable what changes of position and shape that organ undergoes. In most cases it is dislocated upwards and forwards, the urethra being correspondingly dragged up with it into its new position. The urethral tube is either stretched vertically upwards or bent acutely to one side or the other. This pressure upon the vesical neck and alteration in the normal length and direction of the urethra explains why retention occurs so often (71 per cent. of the cases), and also why the surgeon has found it quite impossible to introduce the catheter in a very large proportion of cases of retention due to this disease. This difficulty raises the necessity of a brief consideration of a complaint which is but seldom encountered.* To give you some idea of the change in the position of the bladder I may mention that in James's case† the sac had pressed the bladder so forcibly against the pubes that the viscus had assumed an hour-glass shape. The lower compartment was found empty after death, for it had been evacuated by Cock's operation, and a pint of urine had been removed from it. The upper compartment had not been tapped, and it was found to contain two pints of urine.

* The literature for 200 years contains 100 cases.

† James, 'Austral. Med. Journ.,' Melbourne, 1868, xiii, p. 183.

In Perrin's case* the bladder had been pressed into a left scrotal hernia, and had assumed a bisacculated shape, the constriction being at the pelvic brim. The herniated part of the bladder held five ounces of urine.

In Bryant's case† the bladder was dislocated into the left iliac fossa. It was completely raised out of the pelvic cavity, and contained a quart of urine. In my first case,‡ sent me by Mr. Buncombe, the pressure fell more upon the rectum than upon the bladder. These cysts may oppose so great an obstacle to the free evacuation of the urine, and the sacs may be so large themselves, that the appearance of the belly attracts attention. One case, a man aged fifty-nine, is described as resembling "a woman far advanced in pregnancy;" another, as if he were "three months pregnant." Such expressions as "treated for ascites," "simulating ascites or ovarian disease," "distended to two inches above the navel," are not uncommon in the description of the cases recorded.

It is not unusual in these cases for the symptoms to subside for a while after the retention has been relieved. Whether it is that the distension of the bladder shifts the hydatid sac, and loosens its bed or point of pressure, I do not know. Mr. Bryant's case may be mentioned as a good example. His patient had three separate attacks of retention with seven years' interval between each. Each was quite unrelievable by catheter, but each subsided spontaneously.

A glance at the list of urethral obstructions and that of reflex spasmodic retention will remind you of other familiar causes for retention of urine. As regards retention from spinal cord lesions, I may mention that Fournier met with retention as an onset symptom eight times in 115 cases of locomotor ataxia; only three cases in my list of twenty commenced with retention (p. 304). It is thus a rare symptom of chronic disease, but a most frequent complication of acute spinal or cerebral disturbance.

The Effects of Unrelieved Retention.

As an incentive to prompt treatment in retention I must point out to you how frequently a distended bladder lays the seeds of future disease, even if no immediate accident happens.

Tuberculosis.—Even forced retention in a train, or in the

* Perrin, 'Compt. Rend. Soc. Biol.,' t. v, p. 155, 1853.

† 'Path. Trans.,' vol. xvii, p. 278.

‡ Ibid., vol. xxxvii, p. 317.

company of ladies, is liable to be followed by future trouble. I have known it start tubercular cystitis (Case 67), and this is quite conceivable when we remember how even a slight injury will often start tubercular processes in those predisposed to the disease.

Slight atony.—There is also sometimes a permanent though slight loss of vesical power left after a retention, the degree of which increases with the delay in obtaining relief and with the age of the patient.

Complete atony.—Sir H. Thompson says that he has seen patients who have been unable to empty the bladder for years after a prolonged retention of thirty-six to forty-eight hours.

Rupture of the bladder in retention is not so extremely rare as you are taught. Mr. Rivington,* after an exhaustive search through the literature of the subject, found, out of fifty-nine fatal cases, eleven ruptures of the bladder in stricture, seven due to labour, nine from retroversion of the gravid uterus, eight due to hypertrophy of the prostate, ten due to retention of some other kind.

Dr. Gouley has related the case of a man sixty years of age who was suffering from retention from stricture. The bladder was distended up to the umbilicus; neither catheter nor filiform bougie could be passed. The patient was placed under ether, and during its administration the tumour disappeared, owing to the restlessness of the patient. Death occurred four hours afterwards. Five pints of bloody urine were found in the peritoneal cavity, and there was a laceration at the posterior aspect of the upper fundus half an inch in length, and involving all the coats. The membranous urethra was torn, probably from an injury to the perinæum. In some cases of stricture, straining at stool produced rupture into the peritoneal cavity. Dr. Arthur Garry, of Dublin, related the case of Benjamin Morgan, aged thirty-two, of small stature and stout build, who had an attack of gonorrhœa, which was followed by penile stricture lasting five years. He was not an habitual tippler, but he suffered from occasional stoppage of his water, leading to distension and hypertrophy. One evening he went to stool, and, without previous pain, felt something suddenly jump in his belly. From that time he was unable to pass water; his belly swelled, and he was sick. He lived about thirty-six hours. The post-mortem revealed a hole at the back of the bladder, with three flaps, the wall of the bladder around the hole being thin, as if from over-stretch-

* Rivington, 'Rupture of the Urinary Bladder,' p. 13.

ing. There was no mark of ulceration. In a case recorded by Stoll, an adult male suffering from retention through urethral obstruction was straining at stool, when he felt something burst in the abdomen. He died on the second day, and a rupture was found in the posterior part of the superior fundus. Straining to pass water was, no doubt, the immediate cause of some of the other recorded cases of rupture succeeding retention from stricture.

Extravasation.—As a general rule, in cases of stricture of the membranous or penile portion of the urethra, unrelieved retention and straining lead to ulceration or rupture of the dilated urethra behind the stricture, and to extravasation of urine. Rupture of the bladder itself is exceptional.

Renal distress and subsequent impairment.—Sufficient has been said of the effect upon the kidney of over-distending the bladder (p. 255) to cause you to realise how easily a prolonged backward pressure can damage the secreting tissue of the kidney, and how much more easily irreparable harm can be inflicted if organic renal disease be present.

Death.—Most cases of unrelieved retention terminate fatally by uræmia in five or six days.

Treatment of Retention.

You notice that I pass from the various causes of retention to its treatment without a word on diagnosis. Clinically a diagnosis of the cause of obstruction must either be made coincidently with the treatment, or follow after the retention has been relieved. The symptom is generally too acute to dally with; palliative or expectant treatment is out of place, prompt relief is what the sufferer and his future urinary health demands. It is true that in those who have suffered from obstruction for long, and in the atony of old age with anæsthesia of the bladder, there is much less urgency of the symptoms, but retention in the generality of the cases causes agonising pain.

A glance at the patient, and an inquiry as to whether he has had difficulty with the stream before, is sufficient to enable you to select your instrument.

Is it a little boy? You may expect some spasmodic condition or an impacted calculus; and in the former you will require a French Lasserre catheter, in the latter a small-sized silver catheter and an anæsthetic.

Is it a young man with a history and meatal signs of recent gonorrhœa? You will need a soft Jacques catheter, or a full-sized silk web or black elastic catheter.

Is it a man between thirty and forty? You may have to deal with stricture, and will require a catheter with a guide, or if you have not this at hand, a small French catheter of gum elastic.

Is it a man at or over fifty with a previous clean bill of urinary health? You will generally find a Jacques or a silk Coudée sufficient to pass the swollen or enlarged prostate which is causing the retention. I do not advise you to use silver catheters for retention in the adult without a guide. I rarely use them myself except in cases of onanitic prostates and impacted stone.

I do not dissuade you from putting your patient into a hot bath, or from giving him opium and a purge. This affords great comfort, but it takes time, and should your patient get relief by these means you are looked upon, and rightly so, as being an unnecessary caller. If you fail with instruments, or if you have not got them with you, use these remedies by all means in order to gain time and quiet the patient, and employ if you will any of the other and "infallible" devices advised for acute retention—such as a small piece of ice in the rectum (Cazenave), chloral, quinine in large doses, belladonna locally, muriated tincture of iron (℥xv every half-hour).

In every case of retention one of the great essentials of success is having complete confidence in your ability to relieve the bladder. You will then instinctively impart this to your patient, who will permit of, and even court your manipulation. No case of retention is so difficult to deal with as he who thinks his surgeon is a fumbler, and cannot pass the obstacle. As every fresh form of instrument is taken and tried, at each disappointment, and at the appearance of blood or the production of pain, he will call upon the surgeon to desist, or loudly condemn him for his clumsiness; and when relief is finally obtained, will never accord the credit that is due, or make allowance for the particular difficulty which his case may have presented. But how to obtain this confidence? By providing yourself with suitable instruments,* and by holding

* *Note on instrumentation in retention.*—Successful instrumentation depends not so much nowadays on the practitioner, nor so much upon the difficulty of any individual urethra, but *upon the instrument*. There is no doubt that the English web catheters are the best in the market, but our gum-elastic catheters are brutal in their stiffness. The French are better. Provide yourself with

the reserve trump in your hands in the shape of Potain's or Dieulafoy's aspirator, with which you cannot fail to relieve (*vide* p. 293). Let us consider the treatment more in detail.

Boy.—A drop or two of tincture of opium; an enema of hot water, warm barley water, or thin gruel, or a hot bath is often sufficient to cause an evacuation of the urine in all cases of non-calculous retention. But do not delay more than is sufficient to relieve maternal feelings, for it is not unusual for the mother of the better class to insist on the prior adoption of household remedies. In impacted calculus you may have difficulty, for the urethral tube of a boy is so narrow and delicate that it is easily torn; it is thus essential to give the boy an anæsthetic. The child's urethra is narrowest first at the meatus, and secondly at the scrotal part of the urethra; it is in these positions that the calculus usually sticks. In the former position a free section of the meatus downwards, the injection of warm oil, and the gentlest use of the long thin-bladed sinus forceps (Lister's) will probably be successful. If the stone is above or behind the scrotum it is best to inject warm oil into the urethra, and by repeated taps with the end of a No. 5 or 6 black elastic or silver catheter to dislodge it from its position, and partly float, partly push it into the bladder and draw off the urine. Subsequently the child had better be made to pass his water when lying on his back, to prevent a recurrence of the impaction, and the stone, being small, should be crushed with a No. 5 or 6 lithotrite into fine powder, and either removed by suction or, if you are certain of the completeness of your lithotrixy, you may allow the pieces to be passed at the next urination.

The retention in a young adult.—Retention in the young adult is nearly always due to swelling of some part of the urethral canal. It may be true spasm of the constrictor urethræ, the consequence of an aggravated erosion or granular patch in the deep urethra, but more frequently it is

proper instruments (*vide* p. 295), and I doubt if there will be many "impassable strictures," or that your neighbour will glean with credit retention cases from your practice, or that you will be haunted by a continual dread of failure and discredit in treating retention.

Cases of difficulty will be met with by those who treat the lower classes, and especially such as you meet in this great East End hospital, crowded with seamen and the neglected flotsam and jetsam of the cities of the world; but with care, patience, and proper instruments you will overcome them. Will you ever need Cock's operation? Never, unless extravasation or aggravated perineal abscess is present; but you may have to aspirate supra-pubically.

This is the honest conviction from an experience of large numbers of strictures of the urethra of all grades, of 1000 of which I have careful notes.

swelling of the prostate from a recent attack of gonorrhœa. Choose a No. 6 Jacques rubber catheter with a velvet eye, or No. 6 English flexible silk web catheter with a *solid* end* and a smooth bevelled eye. Subsequently the patient should have a hot water enema, a suppository of morphia, gr. $\frac{1}{4}$, being left in after the rectum has been emptied.

In ruptured urethra.—To thoroughly enable you to realise the difficulties which you will sometimes encounter in rupture of the urethra I must ask you to examine this blown-out healthy penile urethra with me. A long urethroscope cannula is passed down this healthy penile urethra until its end is situated about five inches from the meatus. An aëro-urethroscope (Fig. 11, p. 145) is taken, and air is blown into the urethra until the canal stands out taut and smooth before your eye. You notice how wide and egg-shaped this part of the canal has suddenly become; also that at the bladder end is a puckered orifice—this is the opening of the membranous urethra. As the pressure of the air increases, the opening—which is tightly closed by the resentful spasm of the constrictor in its attempt to exclude air—now resembles a pursed-up mouth. It is almost on a level with the *upper wall*, and much above the boat-shaped concavity of the lower. It is the lacerated, depressed, curled-up lower wall, and the closed highly-placed opening to the membranous urethra which cause the frequent difficulty in passing instruments in ruptured urethra.

Prof. Iversen, of Copenhagen, from a review of twenty-nine cases, agrees entirely with the statements of Cras, Guyon, and Terrailon, that the rupture is most often partial, and that it usually implicates either the inferior or the lateral wall; that it is most frequently just in front of the triangular ligament; that the membranous portion is rarely ruptured unless fracture of the pelvis or disjunction of the symphysis co-exists. He makes a rigid distinction between these two forms, for the latter most often results in rapid and often fatal pelvic cellulitis, whilst the former gives rise to the usual extravasation met with.

In attempting to relieve the retention of ruptured urethra it is better to use a silver catheter, and to keep rigidly to the *upper wall*. By this you avoid the depressed, flaccid, ruptured

* Solid ends should be insisted upon for all catheters; the little blind alley usually left between the eye and the tip of the catheter is a slum of the gravest danger and of Augean septicity.

floor, and may slip in. If you are successful, and there is much bruising of the perinæum, tie the catheter securely in, and make median incision through the perinæum to relieve tension and to favour the escape of clots as they break down. If this latter step is neglected, urine will leak along by the side of the catheter, percolate through the ruptured walls into the perinæal tissue, and induce fever and much more damage than a clean median incision will cause. If the catheter fails, as is often the case, the urethra must be opened* in the perinæum behind the stricture, a catheter introduced into the bladder, the ends of the torn canal found and sutured, according to the extent of the rupture† and experience of the surgeon. The inflation of aseptic air will often aid the successful accomplishment of this manœuvre.

The Treatment of Retention in Stricture.

You will probably be told by the patient, who is usually over thirty, that he has had difficulty in ridding himself of

* *Memo.*—Patient in lithotomy position—perinæum shaved and cleansed; full-sized grooved staff, *without a terminal stop to the groove*, is inserted as far as possible and held firmly on face of obstruction (*i. e.* rupture). Euter knife back towards anus, aiming at the end of the staff; lay urethra open at the spot where rupture is. Arrest hæmorrhage; expose wound freely with retractors. Throw strong light upon it, and attempt to find posterior end. The farther back the rupture, of course the more difficult is the search. Press on belly, and get a little water through the posterior opening if possible. This will guide you. Sometimes both the distal and the proximal ends are torn and twisted up, but usually the upper wall is intact, and forms a link or bridge of mucous membrane between the ruptured ends. Having found the posterior end, pass an elastic catheter of large size (12 E.) through the meatus, across the rupture, through the distal part of the tube, and into the bladder.

† Suture of the resected urethra was first done in 1828. The value of the manœuvre in ruptured urethra is questionable. It is very difficult, and the stitches pass *through* a mucous membrane and a lacerated surface. Paoli Erasme, in giving a successful case of this procedure, quotes the results obtained by Kauffmann, of Zurich, in the immediate suture of transverse wounds of the urethra in dogs, and advocates the immediate suture of the ends of a ruptured urethra ('Ann. des Mal. de Genito-urin.,' March, 1888). MM. Quénu and Picqué believe that urine will filter across the suture and provoke abscess. Lucas-Champonnière condemns it as dangerous. Mollière performs it at a later stage. Cauchois, of Rouen ('Annales,' Oct., 1888), insists upon immediate perinæal section and suture of the ends, with subsequent *sonde à demeure* and antiseptic precautions in traumatic rupture. It is now submitted that the immediate perinæal section and suturing with catgut or fine silk over a full-sized gum-elastic catheter is the best method of preventing the subsequent stricture. Mr. Woolcombe ('Lancet,' Nov. 10th, 1888) records a case, having received the idea from Mr. Sheild's article (*vide infra*). I do not advise it.

Suture of the urethra in cases of perinæal section is advocated by Mr. Marmaduke Sheild ('Lancet,' 1888). Three cases are brought forward, the result of suturing being that the union was speedy and complete.

urine for some considerable time, or that he has suffered from retention before. The pain and distress in this case is much less than in gonorrhœal retention, for the bladder has been previously atonied (p. 158), and its muco-muscular sentient structures are blunted. Inject a small syringeful of warm sweet oil* into the urethra, press it along the penile urethra as far as possible with one hand, while you close the meatus with the fingers of the other. The patient may stand until you have entered the bladder if you have much difficulty in introducing the instrument, but he must lie down when the water is being withdrawn. Now take a French gum-elastic catheter of small size (3 or 4 E.), and pass it gently along the canal. Do not bother about anatomical difficulties, let the instrument go where it will, only gently press it on. You meet with an impediment. Withdraw half an inch, roll the catheter a shade to the right between your finger and thumb; this will throw the point a little to the right on the face of the obstruction which has stopped you. Pass the catheter forward again; the eye, being now directed against a different part of the circle of the opposing face of the stricture, may, with a little pressure, enter and be gripped by the opening. You are now in the track; very gently press onward, pulling the penis out straight to flatten the folds within. If you have searched every section of the circle of the obstruction, and have not succeeded, take a thin Teevan guide or ferret, which screws on to the end of a No. 6 silver English catheter. With a little manipulation you probably will pass it into the bladder. Screw on the catheter. *See that the screw holds.* Then let the catheter follow the guide, and the retention is relieved. Failing this, try a warm bath, and if you are still unable to relieve your patient aspirate above the pubes (p. 293). After you have withdrawn the urine give a dose of quinine, opium, and whisky, and place the patient in a hot bath. But if the patient applies with the canal bleeding from the repeated efforts of another surgeon, do not hesitate to aspirate. Or, if the case has been neglected, and the patient should present himself with perinæal abscess due to stricture and retention, or with extravasation of urine, there is no time to give a warm bath and opium. Delay is criminal. The abscess or extravasation must be laid freely open by a median perinæal incision. For some eight years I have invariably performed internal urethrotomy (cutting

* Oil dissolves cocaine. A 4 per cent. is useful, but the objection to it is that it must be made fresh.

on the roof) after laying open the perinaeal abscess, and have washed out the bladder and tied in a large French catheter for three days. I recommend it strongly to your notice. This plan has been in vogue at St. Peter's Hospital for many years, and I cannot point to a single case in which a bad result has followed as a consequence of the procedure.

Prostatic retention.—Many cases of prostatic retention are quite as difficult to relieve as are some of the worst cases of stricture. The first few attacks are probably easily managed. A No. 6 English soft Jacques or a silk web catheter can be passed and the water withdrawn; but as the disease progresses and subsequent attacks ensue, the prostatic canal becomes irregular, and the gland-tissue tough and resistant, and the introduction of an instrument is often far from easy.

The retention is caused by a valve-like action of the intra-vesical prostate, the urethral orifice being closed more or less completely by the contraction of the bladder on its contents, and the difficulty of instrumentation is due to the same causes and is encountered at the very orifice of the bladder. Your catheter will frequently pass up to the very neck, and then meet with a block like a soft pillow, which will give quite a different feeling from the dead-wall obstruction offered by the face of a stricture.

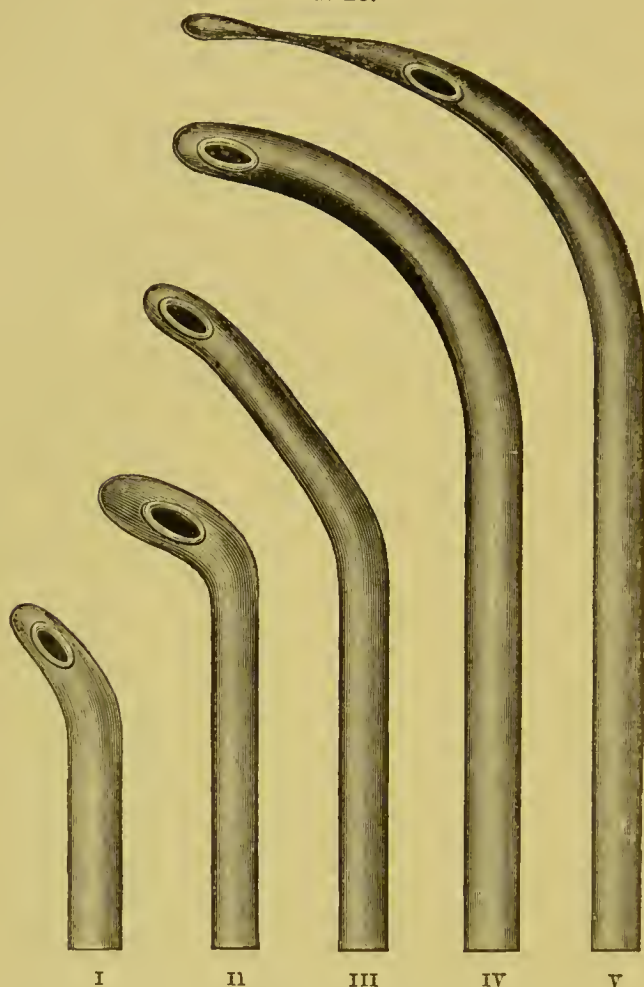
What instrument is to be selected? Many still advise the large curved prostatic silver catheter, but it is better to keep this in reserve until other and softer instruments have failed. It is also wise to be guided in your choice of instruments by the form of the prostate as felt *per rectum*.* If the patient has a *small prostate per rectum* it is certain that the obstruction you have to overcome is in the form of an intra-vesical outgrowth of one of the lobes—usually the median, and the first instrument you select is the soft Jacques; if this impinges upon and cannot pass the lobe, take the silk web Coudée (Fig. 26, 1), the elbow of which enables the end to ride over the obstruction. Should this fail, and from the soft obstruction you find the median lobe to be large and congested, take II, which has a sharper elbow.

If *per rectum* you find the prostate large laterally, and not

* I may remind you that the severity of the symptoms in a case of hypertrophy of the prostate has no relation to its apparent size as felt *per rectum*; it is well known that a considerable number of men aged fifty-five and upwards have prostates of abnormally large size, though only 50 per cent. of these suffer from urinary symptoms. This strange difference depends on the position at which the organ is enlarged. (McGill, 'Brit. Med. Journal,' vol. ii, p. 863, 1889.)

very hard, probably you have to pass a bar at the neck, in which case [a *bicoudé*, III, will succeed; or employ the red

FIG. 26.*



gum catheter† of English make fitted with a stylet. If your finger can hardly reach the summit of the prostate, the

* Modified from Gouley, 'Diseases of the Urinary Apparatus.'

† I may remind you that the English red gum-elastic catheter, armed with its stylet, can be made to assume any large curve the surgeon desires by placing it in hot water, bending it, and removing it to stiffen in cold water. It should be passed so as to maintain the curve, and the manœuvres of William Hey, of Leeds, adopted to increase the curve if needful, thus:—Whilst the instrument is in the deep urethra, when the end of red gum-elastic catheter meets with the prostatic obstacle, withdraw the stylet an inch; this will throw forward the point and increase the curve, and so enable you to carry it over the obstruction into the bladder. ('Pract. Obs. in Surgery,' Wm. Hey, 1814, pp. 399, 400, quoted by Sir H. Thompson.)

lengthened prostatic canal will form a concave sweep like the sacrum, and you must select a Courbé catheter, iv and v; and finally, if there is still obstruction with a very large prostate, and your catheter passes up to the hilt, and you do not withdraw water, it is better to try the large curved prostatic silver catheter. I do not think you will find the bougie conductrice (guide-catheter) of much use, for the guide, being very pliable and thin, catches in the prostatic canal. It is essential that all the catheters used in relieving prostatic retention should be of *large size*.

Catheterism should be followed by a hot bath and a full dose of opium.

Prostatic retention having been relieved, is it wise to allow the catheter to remain in the bladder? If the instrument has passed readily it is better to remove it, for repeated easy catheterisation is less distressing than the catheter *en demeure*; but if there has been extreme difficulty in getting into the bladder it is safer to leave the instrument in, and to change it in thirty-six or forty-eight hours for another catheter of a similar shape, so that urinary salts do not deposit upon it. In the latter case it is a question if a permanent perinæal drainage is not indicated (cf. p. 183).

*Aspiration above the pubes.**—The Potain or Dieulafoy's aspirator is so common an object in the medical wards for exploring the thorax and abdomen, that a description of it would be superfluous. Its value in retention cannot be overestimated. It should be resorted to after a fair trial of catheters, or it may be employed at once if the patient comes under notice with false passages, and bleeding from previous attempts. I have never seen aspiration followed by bad results, if it was performed properly, but lately a case of supra-pubic abscess after aspiration came under my notice, in which the urine was very foul on removal.† As, however, the withdrawal had been executed by a medical man whose operative ventures not infrequently resulted in septicity, I should not like to consider this case as weighing against so valuable and so generally safe‡ a procedure. Aspiration may be used day after day,

* No mention is made of rectal aspiration, for such a proceeding is never necessary. I have never seen it performed in seventeen years' hospital work.

† This patient recovered after prompt incision.

‡ Deneffe and Van Wetter ('Rev. men. de Méd. et de Chir.,' Sept., 1877) have collected 97 cases of rectal puncture with 11 deaths, 152 supra-pubic with 6 deaths. They cite 57 cases of aspiration without accident. (Quoted by Keyes.)

and the large aseptised needle inserted with impunity if three precautions are taken :

(1) Thorough asepticism of the needle.

(2) Washing out the bladder thoroughly with perchloride solution (1 in 10,000) through the cannula after evacuation of *foul* urine.*

(3) Maintaining the suction as the needle is withdrawn, so as to leave no track of urine in the cellular tissue in front of the bladder.

The mons Veneris is shaved and the surface cleansed, the bladder is percussed out, and proved to be projecting above the pubes ; for in some rare cases of stricture, although retention exists, yet the bladder is small and contracted, and lies below the pubes. A small tenotomy knife is then used to puncture the skin in the middle line half an inch above the symphysis pubis, and through the incision the needle is driven backwards and downwards into the bladder.

As a good example of this method, a case is recorded by Mr. Hagen† in which the bladder of an old man of ninety was aspirated once a day for five weeks. No cystitis occurred, only a little cutaneous inflammation at the point of puncture.

Guyon performed thirty-six aspirations upon the same patient in eight days; and "the most simple catheterisation could not have been more harmless."

It is but right, however, to allude to certain cases of aspiration which are recorded in the literature as having been followed by untoward events.

Dr. McFie Williams‡ records a case of urinary extravasation along the track of the needle.

Mr. Bull§ mentions a case of abscess with cellulitis in front of the bladder following a second aspiration; the patient recovered.

Mr. W. H. Bennett|| gives a very convincing case of extra-

* This manœuvre need only be adopted in cases where the evacuated urine is foul, and evidence of chronic cystitis is present. After withdrawing all the urine, syringe in 8 oz. of a warm solution of perchloride of mercury (1 in 10,000), turn the tap and aspirate this out. Repeat the cleansing process several times, taking care to gently move from side to side the point of the cannula in the injected solution. This cleanses its surface of any septic material which otherwise might be *smeared* along the track of exit as the cannula is removed.

† 'Lancet,' Aug. 20th, 1885, p. 385.

‡ 'Brit. Med. Journal,' Feb. 21st, 1880.

§ Bull, 'New York Med. Journ.,' Sept., 1880, p. 305.

|| 'Trans. Royal Med. and Chir. Soc.,' Feb. 22nd, 1887.

vasation of urine following aspiration of a chronically inflamed bladder which contained foul urine, and his case is very similar to the instance I have observed myself. In neither case was any care taken apparently to cleanse the needle before withdrawal. Mr. Bennett suggests that, in the event of an attempt at aspiration being followed by pain and rigidity of the abdominal parietes in the hypogastric region, an incision ought to be made above the pubes, and drainage of the bladder by the perinæal route carried out if the urethra is impassable by catheter.

Suggested Set of Instruments for Retention.

Potain's aspirator.

Silk web catheter with aseptic eye.

Silk web *coudé* catheter, 6 and 10 E. gauge.

Silk web *bicoudé*.

Half a dozen bougies olivaires, with screw attachments to a silver catheter No. 6.

Jacques catheters Nos. 6 and 10 E.

English red gum-elastic No. 10 E. with stylet.

Courbé, conique et olivaire, catheters Nos. 10 and 12 E.

Large silver prostatic catheter.

Uncontrollable Urination.

When the bladder evacuates its contents either partially or completely in a brusque and sudden manner, despite the sphincteric efforts of the patient to prevent it, we have to deal with a case of irrepressible urination and an imperious call. When a portion or all of the urine dribbles away involuntarily our patient is said to be suffering from involuntary urination.

Although these two states are widely different as regards causation, they are included in the subject of uncontrollable urination. It is to be remembered, however, that irrepressible urination upon an imperious call is always a spasmodic resentment of irritation, and that involuntary urination embraces paretic as well as spastic conditions.

The many and varied causes for involuntary urination were formerly grouped under the head of incontinence* of urine.

* Incontinence: *in*, not; *contineo*, to contain.

It is obviously better for this term to be restricted to the designation of those cases in which the sphincter of the bladder is partially or completely inoperative or paralysed, and in which the urine dribbles away through the urethra almost as fast as it enters the bladder from the ureters. Custom has, however, applied the term to the bed-wetting of childhood, and to the overflow (the waste-pipe action) of a distended atonic bladder of tabes or enlarged prostate. The term is therefore qualified in these diseases by the adjective *false*.

Before considering the subject permit me to warn you against accepting, without cross-examination, the statement usually made by the young adult that "he cannot hold his water, it runs from him," and of labelling such a condition as this as incontinence.

Young men after an attack of gonorrhœa frequently apply for relief, stating that their urine drips from them; but a little inquiry will elicit the fact that this only takes place *after micturition*; that after the penis has been replaced and the trousers buttoned, half a drachm to a drachm of urine will trickle out of the urethra and soil the shirt. This symptom is induced by spasmodic action of the constrictor urethræ, the dribbling at the end of micturition being generally due to the premature spasmodic closure of the muscle imprisoning some urine behind it; when the spasm of this "cut-off" muscle subsides, the urine is released and dribbles off. Ultzmann* attributes the symptom to a spasmodic contraction of the organic muscular fibres of the urethra throughout its entire length. He says, "The retention of the urine in the urethra is favoured by the contraction of all the organic muscular fibres, by which the canal is narrowed and its walls made more resistant. Now as long as this contraction of the organic muscular fibres lasts, the urine stands as it were in a tube with rigid walls. It can no more flow out than a fluid out of a glass tube, of which one end is closed. As soon as relaxation of these organic muscular fibres ensues, then the contents of the urethra trickle out just as a fluid out of a tube with thin and soft walls—as, for instance, from a gut filled with water with one end tightly closed."

I cannot altogether accept this teaching; undoubtedly in some cases it is due, as I have said, to myospasm—to the imprisonment of a little urine by the constrictor urethræ,

* Ultzmann, 'Neuroses of the Genito-urinary System,' translated by Allen, p. 44.

which subsequently relaxes. But that this is not the sole cause of the symptom I am quite assured. In some it appears as if the accelerator urinæ muscle had become toneless or parietic, and failed to clear the urethra, and that the urine passively syphoned out on the organ assuming a pendent position. The loss of muscle contractility is probably due to a subacute myositis propagated from the superjacent inflamed mucous membrane (see note, p. 268). Lastly, in some cases there is undoubtedly an obstruction in the urethra due to swelling of the verumontanum or some other part of the prostatic canal, and when the *vis a tergo* of the vesical muscle dies down, a little of the urine lingers behind the impediment, to subsequently ooze from the meatus to the annoyance and discomfort of the patient.

Occasionally a rare and extreme form of this trouble will present itself in the shape of a urethral pouch, which fills with urine on micturition, and on the penis being replaced in the trousers it is pressed upon, and half an ounce to an ounce of urine is squeezed out of the pouch and escapes from the urethral canal. Here is such a case, which was sent me by Mr. Herbert Rayner, surgeon to the R.M.S. "Lusitania."

CASE 97.—He is a sailor, æt. 32, and has suffered from severe stricture, the result of neglected gonorrhœa. Five months ago he had extreme difficulty in urination, which culminated in retention. He used a small catheter which was lent him, and damaged the urethral wall with it in his efforts to relieve himself. Ever since then he has had a large pouch in the penile urethra. He went into a hospital near Adelaide, but was unrelieved, and he therefore returned to England in the "Lusitania" for treatment.

You notice how very thin and feeble the stream of urine is which he passes. It is only produced by a great straining effort, and by much manipulation (like milking) of the penis. At the base of the penis there swells out, like a monkey's cheek pouch, this large urethral sac, which gets more and more distended as micturition proceeds, until it acquires the size of a small egg (hen). The sac and its mouth probably resemble this aneurism (sacculated aneurism). If you could examine this man's urethra with the *aëro-urethroscope* you would see a white sodden tight stricture at one and a half inches; and beyond it, if your cannula could pass the obstruction, a large hole in the floor leading into a milk-white surfaced pouch. This view proved incorrect.

The patient had the stricture cut on the roof; the cannula was passed beyond. It was then found that the pouch was of fusiform shape, the entire floor of the urethra being depressed behind the stricture into the form of a boat-shaped pouch. A long blunt-pointed straight bistoury was therefore introduced, and the stricture freely cut on the floor, so that the urine now flowed easily along a slight ascent instead of struggling through a small opening in the face of an abrupt wall.

The patient left relieved; the sac has almost disappeared by contraction.

Not long ago I showed a more aggravated case than this at the Medical Society.*

CASE 98.—The patient, whose age is 57, had suffered from stricture for the last eighteen years. A year and a half ago the difficulty of micturition culminated in extravasation of urine, for which he was admitted into the London Hospital under the care of my colleague, Mr. McCarthy. A perinaeal incision was made, and one large irregular stone and seven small faceted ones were removed from a pouch of pus and urine, which had taken the place of the urethra immediately behind the obstructing stricture.

The patient passed through a very grave crisis, but finally recovered, and left the hospital with a firm cicatrix in the perinaeum. Some months after, he applied at my out-patients' department with dribbling of urine, and a large hen's egg sized† pouch of the urethra was found, situated two and a half inches from the meatus, and quite unconnected with the incision scar mentioned above. The patient does not remember this pouch at the time of operation, but the rôle it plays in the dribbling of urine is an evident one.

On evacuation of the contents of the bladder the pouch becomes distended, and retains about three ounces in its cavity when the urine has ceased to flow. Every movement of the thighs upon the penis now ejects a small quantity of urine. The pouch is slightly inflamed, for the urine is ammoniacal and loaded with triple phosphates and pus.

Lastly, I may remind you that in all cases of incontinence in females a vesico-vaginal fistula must be excluded by careful examination with a Sims speculum, used in the knee and elbow position, and, if need be, by injecting sterilised milk or some coloured solution, such as indigo or cochineal, into the bladder.

In old women the sphincter often becomes weak, and a little urine is expelled by coughing or sneezing.

The subject of uncontrollable urination may be arranged for consideration as follows :

* 'Med. Soc. Transactions,' 1887.

† Pouches of the urethra as large as this are certainly rare. Cases are recorded by Sir Charles Bell, Gross, Washington L. Atlee.

Uncontrollable urination	Irrepressible urination	Inflammatory.		
		Cystospastic—Reflex.		
		Chorea?		
	Involuntary urination	Childhood	True incontinence	<ul style="list-style-type: none"> Sphincter paresis. After perineal lithotomy.
			False incontinence	<ul style="list-style-type: none"> (Nocturnal.) Dirty habits. Reflex conditions Worms, polypus of rectum, over-acid or alkaline urine. Phimosis.
		Adult life up to fifty	True incontinence	<ul style="list-style-type: none"> Operative injury of sphincter. Advanced tuberculosis of bladder with sphincteric impairment. Other forms of sphincteric impairment.* Injury or disease of spinal cord and brain abolishing sphincter power.
			False incontinence	<ul style="list-style-type: none"> (Nocturnal.) Ataxia with detrusor paresis. Tight stricture. Intoxication.†
	Old age		True incontinence	<ul style="list-style-type: none"> Unsymmetrical enlargement of prostate.
			False incontinence	<ul style="list-style-type: none"> (Nocturnal.) Overflow of an atonic bladder from prostatic obstruction.

Irrepressible Urination: Vesical Tetanus, Cramp of the Bladder.

The resentment of the detrusor muscles can be so violently excited by strong stimuli, acting directly upon the bladder neck or on the vesical mucous membrane, or reflexly from the neighbouring organs, that the urine is ejected almost as

* "Many mechanical obstructions may prevent the closure of the neck of the bladder or render it imperfect—such, for instance, as congenital defects of the prostate and neck of the bladder, epispadias, induration, thickening, rigidity, or incrustation of the wall of the bladder, especially of the trigone, associated with diminution in the capacity of the bladder, concretions and foreign bodies which are fixed and partially block up the viscus. Hypertrophy of the prostate, excrescences, carcinoma at the neck of the bladder, compression of the bladder by neighbouring tumours and organs, such as the pregnant uterus, inversion or dislocation of the bladder, with displacement and stretching of the neck, and the like, may induce incontinence" (Enuresis mechanica).—Ziemssen, vol. viii, p. 721.

† All forms of sopor or narcosis, or even intoxication, may be associated with temporary enuresis; hence the involuntary escape of urine which occurs in severe cases of typhus and typhoid conditions of all sorts.

soon as the call is felt. Many conditions evoke this symptom, which has been already considered under the head of "Frequency of Micturition." I may mention the following:—Caustic injections or applications to the deep urethra, inflammation of the neck of the bladder, acute localised cystitis, acute submucous hæmorrhages of the bladder, urethral caruncle, fissures, catarrhal ulceration of the rectum, acute ovaritis, and metritis. In the early months of pregnancy there is often a constant recurring desire to micturate; if it be not gratified, the urine flows off involuntarily.

The following is a good example of reflex cystospasmus or irrepressible urination from reflex causes. I was at first tempted to regard it as choreic in its nature, but the removal of the prepuce cured the boy, and proved the trouble to be of an ordinary reflex type.

CASE 99.—R. R—, æt. 11, was sent to me by Dr. Roxburgh, of Weston-super-Mare, in January, 1889, to be sounded for stone. The boy would be suddenly seized with a pain in the belly, the precise situation of which he was not able to localise. At the same time he would have an intense desire to pass water and fæces, which he could not resist. Sometimes his clothes suffered; at other times by pressing on the rectum and grasping the penis he could avert the catastrophe. These attacks usually occurred at play. He also had pain at the end of the penis after micturition, and incontinence of urine at night, but the stream of urine was free and uninterrupted.

His elder brother had suffered from a precisely similar annoyance, which dated, as my little patient's trouble also did, from infancy. I could find no rectal or vesical cause for this condition. There was no stone in the bladder.

Dr. Roxburgh suggested circumcision, and in this I concurred. The prepuce was removed and the boy cured.

Chorea of the bladder.—It is held that the bladder may be affected by chorea,* and this is said to usually coincide with other choreic symptoms. It is a rare disorder, and occurs only in children. I cannot say I have met with a case, but Keyes relates amongst other examples the following history:—S. D—, aged eight, is a fine, healthy, lymphatic boy, one of a large family of children, of whom nearly every male has distinct chorea, either generalised or affecting special muscles. Some of the older children have outgrown the tendency. The patient is troubled occasionally with slight general choreic twitching, when from any cause his appetite is low or his general health poor. Under such circumstances he has frequent paroxysms

* Keyes, 'Genito-urinary Organs,' p. 233.

of intermitting uncontrollable contraction of the bladder, forcing him to frequent micturition and attempts at emptying the bladder every few moments. Sometimes the call comes so suddenly that he wets his clothing, and he also is unfortunate at night. When the boy is enjoying good general health, neither his general chorea nor his frequent calls to urinate disturb him. He improves under arsenic, quinine, or any general tonic or country air.

Incontinence of childhood.—(a) *True incontinence.*—The true form of incontinence of childhood, if we except certain parietic conditions of the sphincter depending on disease or injury to the cerebro-spinal centres, is usually met with as a result of perinæal lithotomy.* The wound of the operation heals, the child is discharged as cured, and in a small percentage of cases he returns about a year after with true incontinence, and all its attendant miseries of sodden, eczematous, excoriated genitals, and wet and stinking clothes. There is no doubt this is due to partial loss of power of the sphincter, for the boy can hold an ounce or two of water if he lies down, but directly he stands up the collected urine runs freely from him. This distressing after-result of perinæal lithotomy in the child is one of my reasons for performing supra-pubic lithotomy in all cases of stone in childhood which I cannot crush. I have seen six good examples of true incontinence from the perinæal operation.

CASE 100.—I removed this bladder from a boy, æt. 16, who died here from uræmia in 1890, under the care of my father, Dr. Samuel Fenwick. At the age of six years (ten years ago) he was operated upon for stone in the bladder by a very skilful surgeon to a children's hospital. Since the date of that operation he had had almost complete incontinence. Attempts had been made to remedy the paralysis of the sphincter, but without result. Fourteen days before he was admitted, sickness and headache commenced, symptoms of acute nephritis ensued, and he died two hours after he was received into hospital. The bladder has been opened at the apex. On looking at the neck from inside, a linear cicatrix is seen on the left side of the base, but the orifice is quite patulous, and the entire prostatic canal is an open tube which admits the little finger. A closer examination demonstrates the entire loss of the internal sphincter—whether by fatty infiltration or disuse I cannot say.

(b) *False incontinence (nocturnal incontinence).*—Bed-wetting is most common in boys before the age of ten, though it may continue up to the age of puberty and even later, but it

* A kick or blow upon the perinæum is said to be followed by the same trouble.

is rare for it to be prolonged after the neck of the bladder has attained its full development. I have had five obstinate cases in which the habit or weakness continued until late in life.*

Causation.—It has happened that in three or four of my cases I have been able to learn that the child's father or mother was in a state of semi-intoxication at the period of the impregnation which resulted in the child's conception; in others, that one or other of the parents was habitually the worse for liquor; in others, that fits or mania formed part of the family tendencies. Although these are significant factors, yet too much stress need not be laid upon them. I am confident that nocturnal incontinence in childhood (bed-wetting) is a symptom which is evoked by several structural causes, and is not due merely to hyperæsthesia of the mucous membrane of the bladder. In some there is certainly an exalted sensitiveness of the bladder neck, but in others a distinct valve-like lappet of mucous membrane exists at the orifice, and in others again some slight swelling or excoriation of the mucous membrane of the neck from acidity of the urine is present. In the large majority of cases some source of reflex irritation will be found, such as worms, polypi of rectum, eczema of anus, phimosis, narrow meatus, &c.

Incontinence of adult life.—True incontinence is certainly rare in the adult and in old people; it occurs only when the sphincter has been paralysed by operation or by cerebro-spinal disease. It is, therefore, of the utmost importance to remember in all cases of involuntary micturition (dribbling), commencing after the age of twenty-one, that the symptom is nearly always caused by overflow. In his valuable lectures upon the diseases of the urinary organs Sir Henry Thompson has drawn especial and graphic attention to this, and has formulated a golden rule thus:

Involuntary micturition indicates retention of urine, and not incontinence.

I cannot impress this fact upon you more forcibly than by showing you these four male patients, aged 32, 36, 40, 58. They have all provided themselves with urinals. In each the urine dribbles involuntarily into the receptacle. In each the penis, scrotum, and thighs are sodden and excoriated with the urine. If I percuss the abdomens of these four men, you will hear that the bladder dulness varies. Three have

* It is taught by the French school that such cases are prone to tubercle. Such is not my experience.

bladders so full that the dulness nearly reaches to the umbilicus; but in the first, whose age is thirty-two, there is no distension of the bladder at all: the viscus is empty. These four men will serve to represent the four forms of involuntary mriation that you will meet with as occurring after the age of twenty-one; and before I introduce a catheter, and demonstrate to you that the dull areas I have percussed out are really due to water, and not to heavily laden coils of gut or fat, I will ask them to shut their eyes. You notice that this man aged thirty-six immediately begins to sway from side to side. I at once remove him, for I know that if these two symptoms, incontinence and inco-ordination, are marked, I am dealing with a case of spinal cord disease. I do not wait to examine his eyes or his knee-jerks; the reactions of both may not be characteristic. This man of forty I judge to have stricture on account of his age, and this bougie proves an urethral obstruction to be present. This man of fifty-eight I am certain is suffering from an enlarged prostate for the same reason, and rectal examination shows this view to be correct.

The first case, aged thirty-two, who has no distension of bladder, will inform you that he had a stone removed by median lithotomy a year ago, and that the urine has dribbled away ever since. The catheter shows the bladder to hold only half an ounce. The four cases, therefore, comprise one of true incontinence from traumatic paralysis of the sphincter, and three cases of false incontinence with retention of urine and dribbling away of the surplus, from paralysis of the detrusors, obstruction from stricture, and from enlarged prostate respectively. The first will never recover, the second (ataxia) will be partially dependent on his catheter, the third (stricture) will completely recover after full dilatation of the obstruction, and the last will probably need the catheter to supplement the weakened vesical muscle, unless he permits us to remove the obstructing lobes of the prostate by supra-pubic prostatectomy.

False incontinence of ataxia.—A certain proportion of the cases of ataxia escape without urinary troubles, even though inco-ordination and other symptoms of the disease are present to an exaggerated degree. The larger number of ataxic patients who suffer from their bladder complain of nocturnal incontinence. In my own experience, as you will see from this table, this symptom is most often the first noticed by the patient (12 out of 20). Fournier* finds that

* Of 115 tabetics in whom the disease confirmed or accompanied the urinary

incontinence existed in nearly 30 per cent. (29·5 per cent.). Much, however, depends upon the class and character of the patient. Those who are educated and observant frequently notice a slight difficulty in urination on rising in the morning, before the incontinence at night appears. The latter symptom is too striking and too humiliating, however, to be neglected, and thus it is that the patient applies for relief directly the nocturnal enuresis occurs. I have only once met with this symptom in the female, but then locomotor ataxia is much more common in the male.

No.	Initials.	Syphilis before onset.	Age.	Onset symptoms.	Residuum.	Knee-jerk.	Pupil, &c.
1	H. J.	No note	45	Loss of power to expel; frequency at night, 7—8	20 oz.	Increased	Sphincter ani toneless; sways.
2	W. C.	10 years	32	Incontinence	18 oz.	Right diminished; left increased	Patulous anus.
3	A. D.	4 years	37	Incontinence; walking induces frequency	10 oz.	Increased	Marked gait.
4	C. W.	17 years	48	Incontinence	5 oz.	Increased	Sluggish to accommodation.
5	W. H.	?	52	Incontinence	6 oz.	Increased	Sways; patulous anus.
6	H. D.	13 years	40	Frequency in morning	12 oz.	Absent	Pupils no reaction; has lost sexual power.
7	E. W.	15 years	35	Incontinence at night; frequency and straining in day	10 oz.	Increased	—
8	W. T.	25 years	55	Incontinence	?	Increased	—
9	B.	10 years	39	Incontinence at night, then frequency in daytime	10 oz.	Absent	Ataxic gait.
10	J. H.	Syphilis	40	12 months' difficulty, then incontinence at night	6 oz.	Increased	—
11	H. P.	23 years	45	Retention for 2 hours	—	Absent	Staggering, tingling, &c.
12	B.	Syphilis	37	Nocturnal incontinence	12 oz.	Absent	—

trouble, Fournier has noted simple paresis of the bladder in 45 cases, complete retention in 8 cases, incontinence in 34 cases, anæsthesia of the bladder in 5 cases, cystalgia in 21 cases.

No.	Initials.	Syphilis before onset.	Age.	Onset symptoms.	Residuum.	Knee-jerk.	Pupil, &c.
13	W.	No syphilis	56	Retention	4—10 oz.	Absent	Patulous anus ; pupils myotic.
14	H.B.S.	13 years	37	Incontinence at night	Under treatment	No knee-jerks	Sways.
15	K.	8 years	30	Difficulty of urination in morning	12 oz.	Absent	Slight swaying.
16	P.	7 years	33	Nocturnal incontinence	18 oz.	Increased	—
17	S.	12 years	32	Incontinence	10 oz.	Left side absent ; right side moderate	Pupils immoveable.
18	L.	6 years	35	Difficulty and straining	7 oz. to 12 oz.	Increased	Perforating ulcer.
19	C.	20 years	40	Difficulty	$\frac{1}{8}$ oz.	Nil	—
20	G. D.	10 years	35	Difficulty, then retention	24 oz.	None	—

The involuntary urination observed in locomotor ataxia is at first nearly always nocturnal. The amount and progress of the bed-wetting is very variable ; at first it is usually only an occasional *contretemps*, and many days may elapse before the mishap recurs. As weeks pass by, however, the accident happens more often, and the amount of urine discharged is gradually increased, until finally the involuntary micturition at night is habitual, and the bed-wetting is severe. Should the patient or the practitioner neglect this symptom the bladder begins to overflow in the day. A cough, a sneeze, an extra or sudden exertion, compression of the belly as in stooping down to lace the boot, will cause a teaspoonful or a tablespoonful of urine to spurt out from the urethra, which will be felt by the patient not as it traverses the urethra, but as it trickles down the thigh. When diurnal dribbling commences other signs of bladder incompetence have appeared, and these features may be conveniently discussed before considering the prognosis or treatment of the subject.

The Effects of Chronic Disease of the Spinal Cord upon the Bladder.

The effects of chronic disease of the spinal cord upon the bladder depend obviously upon the extent to which the vesical centres are impaired, upon the treatment to which the urinary complication is subjected, and upon the amount of recuperative power each patient may be possessed of. As these factors vary very greatly, as my cases are not sufficiently numerous to permit me to deduce broad and reliable conclusions, and as the literature has rather neglected this subject, I must content myself with merely glancing at the influence which sleep, day, defecation, coition, posture, &c., exert upon the act of urination.

The Influence of Sleep upon an Ataxic Bladder.

In a small proportion of cases, in which the stage of incontinence has not been reached, there is an extreme frequency of urination. The bladder is atonic, but the sphincter is powerful, and the mucous membrane of the neck sufficiently sensitive to resist incontinence and to call for an act of micturition being attempted.

One patient with a residuum of 18 oz. (knee-jerks exaggerated) was forced to rise seven or eight times.

In others in the stage of incontinence, although the catheter may have been used just before retiring, yet dribbling takes place, as well as repeated calls to urinate.

The Behaviour of an Ataxic Bladder in the Daytime.

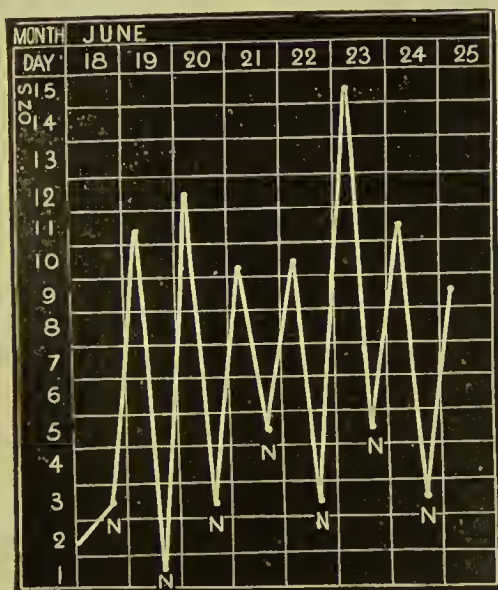
Stream.—The stream is usually small, forcible for the first rush if the bladder is full; it then becomes intermittent, and finally dribbles. On rising in the morning there is frequently extreme difficulty in obtaining a stream at all. The bladder has often to be emptied by catheter, or it is only by repeated efforts whilst dressing that the bladder can and does relieve itself of some of its accumulated contents. In these cases it will be found that the patient has had no call during the night, that the bladder has become so distended that the weakened muscle is unable to cope with its increased load, and it strikes work altogether, or performs its task with

sluggish incompleteness. The residuum will therefore be large in amount in the early morning.

As the day advances, the bladder acts better and more forcibly, the stream increases in fulness, the patient experiences more relief from the act, and the residual urine* diminishes.

These statements are well illustrated by this chart,† recording the residual urine drawn off night and morning for a week (Fig. 27).

FIG. 27.



You notice how low all the night (N) records are, and how high are the morning amounts. For instance, on June 19th my patient drew off 1 oz. of residual urine in the evening, but in the same morning he had removed 11 oz.

In a certain proportion of cases in the early stages, the passage of a bougie will so stimulate the vesical muscle that when the instrument is withdrawn, another 2 or 3 oz. will be passed voluntarily by a spasmodic effort. In one case

* The amount of residual urine is a rough guide to the strength of the bladder muscle. The less the residuum the greater the contractility.

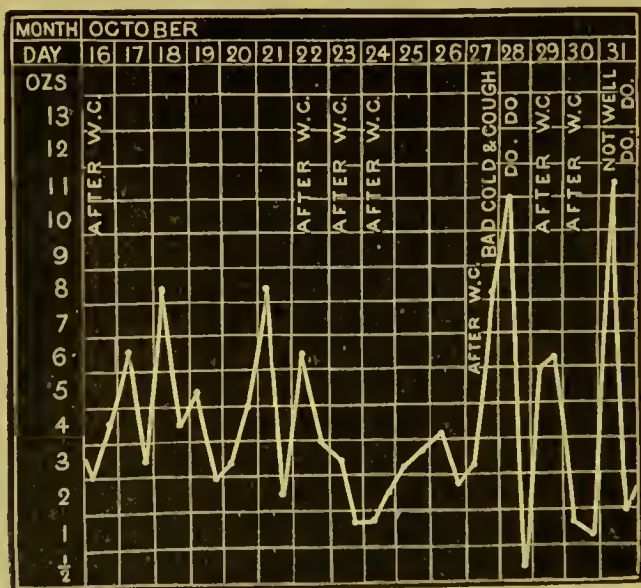
† Each patient is provided with a measure-glass and a chart, and records in this way the amount of residual urine which he removes with his catheter night and morning. I have some of these charts which show an uninterrupted record for six or more months, and from these I have annotated these observations on ataxial streams. The charts are of use in deciding on the advisability of the frequency of catheterisation.

I was able by repeating this manœuvre to cause a bladder, atonied to 10 oz., to empty itself of all but 3 oz.

As far as I know, this reflex stimulation occurs when the knee-jerks are exaggerated. There are other methods whereby the bladder can be emptied; chief amongst them is a rectal enema. From your knowledge of the Braune-Garson investigation of the effects upon the bladder of distending the rectum you can realise how much *point d'appui* a rectal enema will afford a flabby bladder. The patient may not even require this rectal support, for the mere straining at stool in the morning compresses the viscus against a loaded rectum, and helps to evacuate the urine.

Fig. 28 is a residual chart of the same patient who formed the subject of Fig. 27. You notice the striking difference between the two. The alteration does not depend so much on treatment as you might suppose. The change is due to removing the residual urine after the morning action of the bowels.

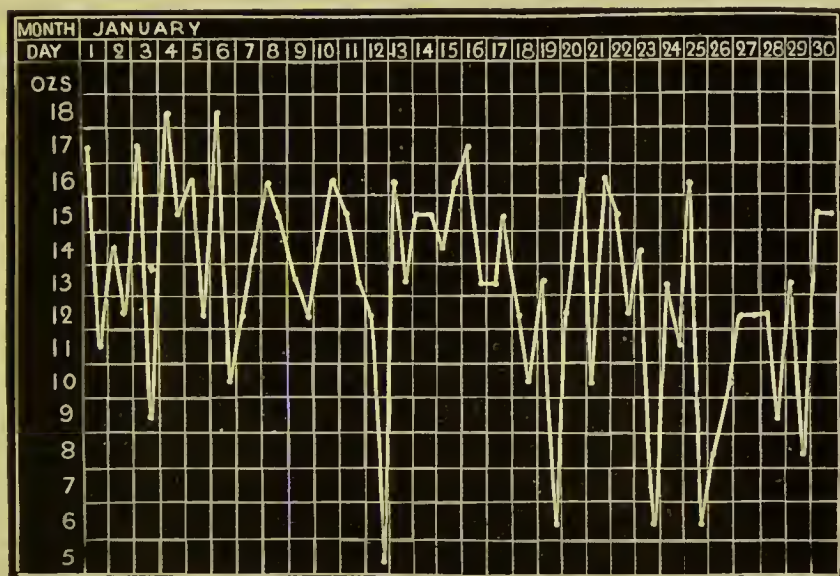
FIG. 28.



The influence of weather; fatigue.—The amount of residual urine withdrawn depends, of course, on many causes. Damp, cold, or wet increases the residuum because more urine is secreted; probably also the same sort of weather or climate acts upon the nerve-trunks, and increases the paresis, for the

patient complains of a coincident increase in the tabetic pains. I conjecture that the nerve-sheaths are to some extent hygroscopic. Fig. 29 was constructed by a patient during snowy weather, and differs from his ordinary chart by great fluctuations. Thunder upsets one patient's chart. Summer weather was favorable for all.

FIG. 29.



Fatigue, nervous exhaustion, diminishes the contractility of the bladder very markedly. One patient, whose residual urine mounted every Saturday and Sunday morning, gave me the clue to this influence. He himself remarked how exhausted he became from his employment towards the week's end. You notice on Fig. 28, on the 27th and 31st of October, how a cold and a transient indisposition increased the amount of residual urine.

Coition is usually followed by diminished vesical contractility, and the residuum increases. In one patient, whose marital intercourse apparently was fixed for Wednesdays, a very marked and periodic rise was noticeable after the middle of the week.

The influence of posture.—Whilst standing or walking frequency of micturition is excited by the superincumbent water-pressure. More water is therefore passed, and less residual urine is found on catheterisation.

The influence of catheterism upon residual chartings is very

suggestive; after the patient commences this treatment the amount of residuum gradually drops just as in stricture, and a portion of the innervated muscle recovers. Sometimes this recovery is from 18 or 24 oz. to an average 10 oz.

Diagnosis.—(a) Locomotor ataxia.*—I think I may state that whenever vesical troubles *other than pain* are noticed, some of the characteristic signs of spinal cord disease—the motor, sensory, and reflex symptoms—will be present. The most constant of these is the inco-ordination of the movements of the legs, as evidenced by the unsteady gait or swaying, which may have been noticed by the patient when he walked in the dark or shut his eyes in washing his face. The best test is to get the patient to close his eyes and walk backwards. There is also a loss or diminution of reflex action from the skin, and of the myotatic irritability that is revealed by the so-called tendon-reflexes, and especially by the knee-jerk.

Sensory symptoms consisting in pre-ataxial ano-vesical neuralgia may have been present for some time before inco-ordination, but this is rare (p. 241). Usually spontaneous pains of a sudden and lancinating character are present, “lightning pains.” Loss of sexual power is exceedingly common, but it may remain unimpaired even to a late stage in the disease. In some retinae the reflex action of the iris to light is lost, but the contraction on accommodation is preserved (Argyll-Robertson). The pupils are sometimes very small (spinal myosis).

(b) Chronic myelitis.—But it is not only in typical locomotor ataxia that bladder symptoms occur. They are present in nearly all diseases of the cord, notably in chronic myelitis. You must not, therefore, be misled by the presence of *exaggerated knee-jerks* and healthily acting pupils into negating the presence of a chronic disease of the spinal cord. Half the cases of spinal atonies of the bladder I have met with have exaggerated knee-jerks (compare list, p. 304).

I wish you to notice that in sixteen cases, out of eighteen in which the fact is noted, a history of syphilis was obtained.

Prognosis.—I cannot say I have ever seen confirmed sphincteric paresis after lithotomy recover. The bed-wetting of childhood usually ceases before puberty. If it continues after that epoch it is very difficult to cure. The true incontinence of adults is usually beyond our skill. The adult forms of involuntary micturition at night, met with in stricture and enlarged prostate, are at once relieved by instrumentation. You can never promise to prevent bed-wetting in the ataxial

* Consult Gowers, ‘Disease of the Spinal Cord,’ p. 290.

form. You can only state that the greatest hope may be entertained that the use of the catheter before going to bed will prevent the mishap ; but no promise should be made, for in some cases in which anæsthesia of the neck is present, the bed-wetting continues despite the removal of the residual urine.

Treatment.—As bed-wetting in childhood is often due to uric acid or other irritating states of the urine, a careful examination of the secretion should be instituted, and the morbid condition corrected ; all sources of reflex irritation—ascarides, gastro-intestinal catarrh, anal eczema, phimosis, &c., should be combated. If phimosis is present, circumcision is indicated ; but as a comment on the routine removal of the prepuce for this trouble I should like you to note the case of this boy, who has been treated in several hospitals for incontinence.

CASE 101.—He is 12 years of age ; his genitals are sodden with urine ; he has been half poisoned with belladonna, strychnia, and various drugs : his prepuce has been removed, but nothing which has been done has been of any benefit. On turning the boy round you notice a slight projection of the first lumbar vertebrae ; when he stoops you see that the back is held rigid, and that the muscles have wasted in their intervertebral grooves. The cause of the incontinence is obvious. He has had angular curvature, and pressure on the spinal cord ; the disease is healed, but the effects on the bladder remain. On the introduction of this catheter five ounces of urine are drawn off ; the anal sphincter is proved by the finger to be patulous. Obviously, no treatment but the catheter will suffice, and all other treatment might have been avoided by stripping the patient.

The child should have a limited amount of fluid at tea-time, and none subsequently. A large cotton-reel should be tied round the waist, and so placed that its pressure on the back will prevent the dorsal position being taken. A hard mattress should be slept on. A strong light in the room prevents too deep a sleep. The child should be roused thoroughly from his sleep twice or thrice a night and made to empty the bladder. Cold sponging to the back and loins is often useful.

Tonics, such as tincture of perchloride of iron and nuxvomica, are often invaluable, but belladonna is the sheet-anchor of the practitioner in this troublesome complaint. It should be given in doses gradually increased four times in twenty-four hours. The *Rhus Aromatica** (sweet sumach) and tincture of *lycopodium* are worthy of a trial.

* *Extractum Fluidum Rhois Aromaticæ* is the preparation used, of which from 5 to 15 drops are given night and morning in a little milk according to the age of the child. Treatment must in many cases be persevered in for three or four months in order to obtain a lasting cure.

Sir Dominic Corrigan suggested that the child should have the meatal lips or the prepuce sealed with collodion before going to bed. I have heard this is useful, but have not tried it. When all these measures have been tried, I rarely fail with a weak constant current, used in the manner advised by the late Dr. Steavenson.*

The incontinence of ataxia is best treated by catheter, and the tendency to cystitis is held in check or prevented by appropriate injections. In one case which I showed before the Medical Society an atony of 18 oz. and a total loss of sexual power had been completely recovered from, apparently by means of a modification of the Motchütkovsky-Charcot suspension method.†

In another case, which had been pronounced as incurable

* The late Dr. Steavenson thus describes his method of treating incontinence. It is not exactly the same as that followed by Guyon and Unverricht. He stated that he had rarely to pass an electrode into the urethra; and he thought that failure often ensued if the second electrode was "moved from place to place over the pubes." His reasons were that "the tendency of all electrical currents is to take the shortest route possible to complete the circuit, always of course choosing the road offering the least resistance. If one electrode is placed on the lower dorsal spine and the other above the pubes, the sphincter vesicæ is almost completely without the circuit, and then receives very little direct influence. In cases where there is weakness of the sphincter, unless an electrode is placed in the urethra itself, the most advantageous position for the second electrode is the perinæum." He seldom used the interrupted current, although it is strongly recommended by Erb. His usual plan was to place a pad connected with the negative pole of a continuous current battery over the lower dorsal region of the spinal column, and a small button electrode on the perinæum. He advised that the electrode connected with the negative pole should be the fixed one, because of the sensitiveness of the parts to which the second electrode has to be applied, and the small space, and therefore the difficulty experienced in moving the electrode about. "In all cases a very weak current is used, and therefore the fixed negative electrode, being of wide surface, does not painfully affect the back; whereas if the current were reversed, and the button electrode in the perinæum made negative, a weaker current still would have to be used to enable the patient to bear it." In the treatment of atony of the bladder, incontinence of urine, or undue frequency of micturition he usually employed the current for eight or ten minutes every day or every other day, the great majority of cases only requiring about eight or ten applications.

† The treatment of locomotor ataxy (*tabes dorsalis*) by suspension was first brought to the notice of the medical profession by a lecture of Prof. Charcot's, in January, 1889, in which he gave the results of his observations during the end of 1886.

The credit of discovery belongs to Dr. Motchütkovsky, of Odessa, who published a paper on the subject in 1883. This paper had apparently escaped notice until Prof. Charcot was led to carry out the treatment by the report of its efficacy received by him from Prof. Raymond, of Paris, then in Russia. Motchütkovsky made the discovery of the value of suspension by chance, his attention being drawn to it by observing the improvement which followed in a tabetic patient after suspension in Sayre's apparatus for the purpose of applying a plaster jacket.

by two of our leading neurologists, a great improvement in all the symptoms took place after systematic suspension.

CASE 102.—C. D—, æt. 36. Syphilis twelve years ago, under Dr. Hogg, of Ealing. *Onset symptom* five or six years ago; before consulting me he began to suffer occasional but intense pain in the perinæum. It lasted three to five minutes, and occurred whilst at stool or on coition, or after a nocturnal emission (compare p. 241). Three months ago numbness of the fingers and toes was complained of. Staggering gait and vesical paresis appeared coincidently. Loss of sensation had crept up to the chest during the last month. My note of his first visit runs as follows:

“Patient walks by the aid of two sticks. His legs are placed wide apart, and thrown forwards with difficulty and with a jerk at each step. He has lost all rectal reflex. His stream of urine is intermittent, requiring great straining to evacuate it. A little urine runs away on coughing, but there is no incontinence at night.

“On sitting down he says he feels as if he were resting on a vacuum.”

Knee-jerks very slight. Erection power unimpaired. No stricture, only a tender prostate encountered on urethral examination.

The patient was sent to Margate and suspended, by means of a tripod, every morning for a few seconds; he took mercury under Dr. Rose’s supervision, and I was astonished to see him walk into my consulting-room four months afterwards without sticks and without much staggering.

The “vacuum feeling” on sitting was better, the shooting pains in the legs had subsided. He had some difficulty with the bladder, but even this has diminished.

He still suffers from an intense pain in the perinæum after an emission, which goes like a knife cutting forwards into the penis and testicles and backwards into the anus. It lasts two minutes and disappears. He has gained half a stone in weight.

With the exception of these two cases I have seen no benefit accrue from the method.

You are often told that electrolysis or faradic currents to the tabetic bladder are invaluable. I have never met with a case, nor has any electro-therapist to whom I have sent my cases been able to reduce the amount of residual urine (the sure test of recovery of the muscle) by these means.

SYNOPSIS OF SECTION VIII.

1. *Abnormal Urination.*

Alterations in the volume of the stream (size of efflux); (compare retention)	{ (a) Sense of obstruction developing suddenly, p. 259 (b) Sense of obstruction developing gradually, p. 259	{ Gonorrhœa. Acute prostatitis. Impaction of stone in urethra. Congested senile prostate. Onanitic prostate, p. 259. Chronic prostatitis, p. 260. Stricture. Chronic lesions of spinal cord, p. 261. Stone in the bladder. Orificial valves of mucous membrane, p. 262. Stone in urethra. Senile enlargement of prostate. Pelvic tumours, p. 266.
Alterations in the continuity of the stream (interruption of efflux)	{ (c) Efflux arrested suddenly, p. 267 (d) Efflux arrested intermittently, p. 267	{ Stone, clot, pedunculated growth, foreign body, p. 267. Spasm. Atony, muscular or nervous. Muscular enfeeblement of fever or old age.
Alterations in the direction of the stream (the parabola)	{ Stream bifid Stream vertical, p. 268	{ Stricture. Enlarged prostate.

2. *Impossible Urination.*

(*No urine passed.*)

Sup- pression of urine	Non-obstructive, p. 270	<ul style="list-style-type: none"> Renal disease. Shock, p. 270. Septicity, p. 271. Hysteria, p. 270. Reflex causes, p. 271. Injury to one kidney. Ureteral obstruction.
	Obstructive, p. 274	
Reten- tion of urine	Cerebro-spinal injury.	
	Shock, p. 278.	
	Fevers, p. 279.	
	Neighbouring inflammation, p. 279	<ul style="list-style-type: none"> Peritonitis. Perinephritis, p. 280. Pelvic abscess, p. 280. Ischio-rectal abscess, p. 280.
	Pressure on bladder neck, p. 281	<ul style="list-style-type: none"> Uterine displacements, &c. Rectal collections. Pelvic growths. Vesico-anal hydatids. Soft malignant growths of prostate.
	Urethral obstruction	<ul style="list-style-type: none"> Acute prostatitis. Congested stricture. Impacted stone in children. Ruptured urethra. Enlarged senile prostate.
	Reflex spasmodic action	<ul style="list-style-type: none"> Anal operations. Radical cure of hernia, hydrocele, vari- cocele.
	Nerve lesions	<ul style="list-style-type: none"> Acute myelitis. Tabes (7 per cent.), p. 283.

3. *Uncontrollable Urination.*

Irre- pressible urination	{ Inflammatory, p. 299. Cystospastic—Reflex. Chorea?	
	Child- hood	{ True inconti- nence, p. 301 { Sphincter paresis. After perinæal lithotomy.
		{ False inconti- nence, p. 301 { (Nocturnal.) Dirty habits. { Worms, polypus} of Reflex conditions { rectum, over-acid or alkaline urine. Phimosiis.
	Adult life up to fifty	{ True inconti- nence { <i>Operative</i> injury of sphincter. Advanced tuberculosis of bladder with sphincteric impairment. Other forms of sphincteric impairment. Injury or disease of spinal cord and brain abolishing sphincter power.
		{ False inconti- nence { (Nocturnal.) Ataxia with detrusor paresis, p. 303. Tight stricture. Intoxication.
	Old age	{ True inconti- nence { Unsymmetrical enlargement of prostate.
		{ False inconti- nence { (Nocturnal.) Overflow of an atonic bladder from prostatic obstruction.

APPENDIX.

A. *Hæmaturia in Chronic Bright's Disease.**

DURING the progress of the various forms of chronic Bright's disease the walls of the Malpighian capillaries become thickened, and therefore probably less liable to be ruptured. In many cases, too, the muscular walls of the minute arteries are more or less hypertrophied, and the effect of this is to lessen the pressure upon the Malpighian capillaries and the risk of their rupture. This appears to be the explanation of the undoubted fact that the pale urine of low specific gravity which is secreted by kidneys in an advanced stage of degeneration is rarely tinged with blood.

This rule is, however, not without exceptions. In the advanced stage of all forms of chronic Bright's disease the blood becomes much deteriorated, and the minute arteries and capillaries may undergo degenerative changes which increase their liability to rupture. There is consequently a tendency to hæmorrhage from various mucous surfaces, *e. g.* bladder and pelvis of kidneys.

You will probably find there are no blood-casts of the tubes as there usually are when the substance of the kidney is the source of the bleeding. You may find some of those forms of tube-casts which point to the existence of chronic rather than acute disease, *e. g.* oil-casts, large granular and large hyaline casts.

* 'Medical Lectures and Essays,' Sir George Johnson, p. 747.

*B. Dr. Newman on the Ratio of Hæmoglobin to Albumen.**

When homogeneous white light is passed through a solution containing a small quantity of blood-pigment (hæmoglobin) the spectrum, instead of being continuous, is seen to be intersected by dark absorption bands. These bands afford a means of detecting the presence of hæmoglobin, and of estimating it quantitatively. Blood-pigment exhibits a very characteristic absorption spectrum. Hæmoglobin, while in a very dilute solution, gives two absorption bands, one in the orange and another in the green portion of the spectrum, between Fraunhofer's D and E lines. The one next D is narrower, blacker, and more sharply defined than the band close to E, and, on diluting the solution, it is the last to disappear. The former is still present when a solution containing one part of hæmoglobin in 22,000 parts of water is examined, the stratum being equal to two centimetres in thickness, while in so dilute a solution the band next E is no longer apparent. The point at which the band next E disappears having been determined, we have a means of estimating the percentage of blood-colouring matter in the solution.

The instrument which I use for this purpose is somewhat similar to the hæmatoscope employed by Hermann. It consists of a brass tube about 10 cm. long and 2 cm. in diameter; one end is closed by a glass plate, and into the other extremity a sliding water-tight piston is introduced. This piston consists of a smaller brass tube, the inner end of which is also closed by a glass plate, while into the other end a small spectroscope is introduced. By passing the piston into the larger tube, a cell is formed (by the walls of the outer tube and the two glass plates), the depth of which may be modified within certain limits by sliding the piston out and in, and the thickness of the enclosed stratum of fluid may be measured by means of a scale engraved upon the inner tube. The fluid to be examined is passed into the cell through a hole in the outer tube close to the glass plate. Suppose we wish to estimate the percentage of hæmoglobin in a solution, we know, to start with, that in a solution containing 1 part of hæmoglobin in 22,000 parts of water we lose the absorption band next E when the stratum is 2 cm. thick. Now, if the solution be more concentrated, we cease to see the band next E with a thinner, and if it be less concentrated, with a deeper stratum, the depth of the layer being in an inverse

* D. Newman, 'Lectures on Diseases of the Kidney,' 1888, p. 81.

ratio to the concentration of the solution; therefore by a simple calculation the quantity of hæmoglobin may be estimated. When the solution contains more than 1 per cent. of hæmoglobin it is necessary to dilute it, so as to make the observation more exact. Now if 1 c.c. of defibrinated blood be added to 100 c.c. of urine, the mixture will be found to contain .124 per cent. of hæmoglobin and about .078 per cent. of albumen coagulable by heat.

You will observe that while the quantity of blood is sufficient to impart to the urine a dark red colour, there is an extremely small quantity of albumen. This simple experiment prepares one for the fact observed by clinical experience, that the admixture of blood with the urine, after it has been secreted, is not associated with any considerable albuminuria.

The quantity of hæmoglobin having been estimated by the method I have just described, and the amount of albumen determined by one or other of the recognised processes, the two results should be compared: if the ratio of albumen to hæmoglobin is as 1 to 1.6, then it may be concluded that the appearance of albumen is entirely due to the presence of blood; but if the quantity of albumen is much increased beyond the proportion just mentioned, the indication is in favour not only of an independent albuminuria, but also points to a renal affection as the cause of the hæmaturia.

C. Thirty-eight out of Fifty Cases of Carcinoma of the Bladder under the Author's Observation, in which Hæmaturia preceded Frequency of Micturition and Pain.

No.	Initial.	Sex and age.	Medical attendant.	Diagnosis.	Confirmed.	Onset of symptoms.	Published.
1	N. C.	M. 70	Mr. Eve	Subsessile lobulated growth on base	Drained, autopsy	Symptomless hæmaturia for 13 months, then cystitis	Elcct. III., 2nd ed., p. 180.
2	Mary B.	F. 55	Mr. Heycock	Pedicle fibropapilloma with carcinomatous base, left lateral base	Operation	Two years' occasional painless hæmaturia, then frequency and pain	Ditto, p. 173.
3	J. L.	M. 62	Mr. Heycock	Villous epithelioma (?), posterior wall	Lost sight of	Hæmaturia; no pain; no residual one year after onset	Ditto, p. 166.
4	G. M.	M. 63	Mr. Edwards	Villous epithelioma, entire surface	Lost sight of	Three years' intermittent hæmaturia; painless until cystitis set in	Details unpublished.
6	R.	M. 40	Dr. Fly Smith	Phosphatic covered carcinoma, postero-superior wall	Operation, recurred, autopsy	Sudden appearance of bright red blood. Intervals of 8 months' and 7 months' absolute freedom	Elcct. III., 2nd ed., p. 107.

No.	Initial.	Sex and age.	Medical attendant.	Diagnosis.	Confirmed.	Onset of symptoms.	Published.
7	?	M. 43	Dr. Harle	Villous papilloma, with an epitheliomatous base (?), ureteral orifice	Went to Australia	Sudden onset of bright blood after lifting. No pain or frequency	Elect. Ill., 2nd ed., p. 91.
8	Mr. O.	M. 56	Dr. Travers Stubbs	Epithelioma, posterior wall	Autopsy	Coffee-coloured blood after driving in a trap; intermittent painless hæmaturia for over a year	Ditto, p. 157.
9	Mr. W.	M. 39	Dr. Sparrow	Hard epithelioma, post-trigonal	Autopsy	Incontinence at night (history of syphilis); hæmaturia; symptomless for 9 months, then cystitis	Ditto, p. 154.
10	Mr. L. T.	M. 62	Dr. Fredk. Simms	Epithelioma, right lateral wall	Died with obvious evidence of malignancy	Painless hæmaturia after exertion; intermittent for 2 years and 9 months, then pain	Ditto, p. 178.
11	Mr. J. H.	M. 53	Dr. Woodforde, of Plaistow	Sarcoma, right ureteral orifice	By cystotomy for drainage	Florid blood, first intermittent, then continuous; painless for 2 years	Ditto, p. 169.
12	J. C.	M. 60	E. H. F.	Epithelioma, ureteral orifice	Died in 8 months	Lithuria, then painless, profuse, intermittent hæmaturia for 5 months	Ditto, p. 183.
14	S.	M. 35	Mr. Walter Coulson	Phosphatic covered epithelioma	Autopsy	Beef-tea urine, rapidly becoming bright and vesical for 3½ mos., then pain and frequency	Ditto, p. 147.
15	Mr. J.	M. 60	Dr. Passmore, of Luton	Epithelioma, left lateral wall	Autopsy	High-coloured urine, then hæmaturia; intermittent, painless for 2 months	Ditto, p. 211.
16	Mrs. B.	F. 44	Dr. Oldfield	Small columnar-celled carcinoma	Removed; microscopy; has recurred twice	Hæmaturia florid, then pain and frequency	Ditto, p. 167.
17	Mr. G.	M. 65	Dr. Llewellyn	Epithelioma, right half of trigone	Autopsy	Mahogany-coloured blood, but painless for 12 months	Ditto, p. 182.
21	K.	M. ?	Mr. J. McCarthy	Right posterior and superior wall, a sloughy epithelioma	Autopsy	Lifting a case of wine felt something give way; immediately passed a pint of blood; hæmaturia profuse for 6 weeks, without frequency	Unpublished.
22	Mr. H.	M. 59	Messrs. Blaker, Verrell, and Couling, Brighton	Soft growth of entire posterior wall of bladder	Died	Two and a half years' bleeding, without pain, until the influenza (?) induced cystitis	Ditto.
27	Mrs. W.	F. 58	Dr. Harvey, of Eastbourne	Hard epithelioma along right side of trigone	Autopsy	Painless hæmaturia for 5 months, then pain and frequency	Ditto.
28	Mr. W.	M. 40	Dr. Squire, Birmingham	Large villous-covered epitheliomatous (?) growth, right side of bladder	Operation; microscopy showed malignancy	After exertion suddenly passed bright blood; no frequency or pain, except due to clots, for 12 months	Ditto.
29	Mr. M.	M. 69	Mr. Swinford Edwards	Villous-covered epithelioma, stalked, left side of trigone	Refused treatment	Sudden hæmaturia; painless 4 months; no frequency	Ditto.
30	Mr. H.	M. 55	Dr. Dickinson, of Bow	Hard, smooth-surfaced epithelioma right side of base	Died	Sudden hæmaturia, profuse and intermittent; painless for 12 months	Ditto.
32	Mrs. C.	F. 50	Dr. Washington Isaacs	Subsessile, hard epithelioma at right base	Digitally	Blood for 6 months, then pain and frequency	Ditto.
33	Mr. T.	M. 62	Dr. Douglas, of Bournemouth	Carcinoma, right ureteral orifice	Died, with obvious evidence of malignancy	Port-wine or rose-red coloured urine continuous until death; painless for more than a year	Ditto.

No.	Initial.	Sex and age.	Medical attendant.	Diagnosis.	Confirmed.	Onset of symptoms.	Published.
34	Mr. C.	M. 61	Dr. Kisch	Epithelioma behind left ureteral orifice	—	Coffee-coloured hæmaturia, intermittent and painless, increased by exercise	Unpublished.
35	Mr. D.	M. 46	Dr. Morgan, Pontypridd	An epitheliomatous growth behind left ureter	Operation microscopy	Pushing a heavy weight, and passed coffee-coloured blood; symptomless for 3 months	Ditto.
36	T. M. P.	M. 48	Hospital case	Small epithelioma, bladder base	—	Hæmaturia for a year, then frequency and pain	Ditto.
41	Mr. S.	M. 62	Mr. Couling, of Brighton	Epithelioma, left base	Died; obvious bimanually	A streak of blood, then bloody urine with clots; painless for 6 months	Ditto.
42	Mr. A.	M. 52	Dr. Best, of Dover	Growth, postero-superior wall	Autopsy	Sudden and profuse hæmaturia 15 months, then frequency and pain	Ditto.
43	Mr. C.	M. 73	Dr. Child, of Malden	Epithelioma, right side	Felt bimanually; died	Profuse and painless hæmaturia of a deep brownish colour, then frequency and pain	Ditto.
44	Mr. W.	M. 50	Dr. Stewart, Newport-on-Tay, Dr. Byron Bramwell, Mr. Wallace	Non-infiltrating soft phosphatic encrusted epithelioma	Suprapubic removal; microscopy denoted acute malignancy	Forced to run to catch a conveyance; symptomless intermittent hæmaturia for a year	Ditto.
45	Mr. R. L.	M. 57	Dr. F. F. Allan	Carcinoma; infiltrating wall on right side	Died	Painless, intermittent, profuse hæmaturia for 10 months, then pain and frequency	Ditto.
46	Mr. P.	M. 70	Dr. Maxwell, of Woolwich	A hard carcinomatous tumour, posterior wall, like a bisected lemon	Cystotomy for drainage	Overstretching in gardening; dark coffee-coloured urine ejected, followed in 6 months by frequency and pain	Ditto.
47	Mr. J. B.	M. 57	Mr. Heycock	Villous-covered growth; left ureteral orifice	Still living, refuses treatment	Strong tea urine and pea-sized clots; symptomless	Ditto.
48	L.	M. 68	Hospital case	Entire right half of bladder, back and base, full of soft growth	Lost sight of	After lifting a heavy beam he passed blood; gradually frequency set in	Ditto.
49	J. S.	M. 44	Mr. McCarthy	Epithelioma, posterior wall, left of median line	Cystotomy for drainage	Sudden snap in over-reaching; 3 weeks after profuse hæmorrhage with clots; in a month frequency and pain	Ditto.
50	S.	M. 53	E. H. F.	Bladder full of soft growth	Died	Profuse and intermittent hæmaturia for a year, then pain and incontinence	Ditto.
51	F.	M. 57	E. H. F.	Right side of bladder full of growth	Still living	Sudden and profuse hæmaturia after a blow; intermittent, symptomless for some months	Ditto.
52	Mr. G.	M. 39	E. H. F.	Soft carcinoma of entire vesical wall except base	Cystotomy for drainage	Eight years before death hæmaturia, then frequency; cystitic climax 10 weeks before death	Ditto.

D. Twelve out of Fifty Cases of Carcinoma of the Bladder under Author's Observation, in which Frequency and Pain preceded the Bleeding.

No.	Initial.	Sex and age.	Medical attendant.	Diagnosis.	Confirmed.	Onset of symptoms.	Published.
13	Mrs. H.	F. 61	Dr. Herman	Succulent epithelioma, right side of bladder	Digitally	Heavy aching in supra-pubic region 3 months before blood, but no frequency	Elect. Ill., 2nd ed., p. 180.
14	J. A.	M. 75	E. H. F.	Flat epitheliomatous ulcer, right side of trigone	Died in 3 months	Great pain and frequency for 1 month, then blood	Ditto, p. 184.
18	W. B.	M. 87	Dr. Wood, of Boston	Carcinoma of anterior wall and anterior section of prostate	Autopsy	Symptoms of stone for 1 year; especially constant desire to micturate and pain	Unpublished.
19	G.	M. 68	E. H. F.	Hard infiltrating carcinoma, left lateral wall and base	—	Frequency and pain a month before blood	Ditto.
22	G. R.	M. 65	Mr. Harrison	Anterior and left lateral wall carcinoma, scirrhous-like	Autopsy	Blood, frequency, and pain coincident	Ditto.
23	Mr. C.	M. 52	Dr. Stewart, of Newport-on-Tay	Ulcerating infiltrating growth, right half of trigone	Died in 17 months	Burning at suspensory ligament; irritability, followed in 4 months by blood	Ditto.
24	Mr. B.	M. 52	Dr. Wolfenden Collins, of Sydenham	Entire bladder surface covered with soft growth	Cystotomy for drainage	Frequency and pain for 8 months, then blood profuse	Ditto.
30	Mr. J.	M. 52	Mr. Heycock	Epitheliomatous ulcer on left side of base	Died	Frequency and pain 1 year and 4 months before blood appeared	Ditto.
35	Mrs. F.	F. 54	Dr. Herman	Hard-based, sessile, post-lingual epithelioma	Digitally	Frequency 3 years and 5 months before blood	Ditto.
37	Mr. M.	M. 32	Dr. Cooper, of Norbiton	Hard epitheliomatous ulcer, right wall	Autopsy	Frequency and pain 3 months before blood	Ditto.
38	J. S.	M. 64	Dr. Elwin Harris	Much epitheliomatous growth in bladder	Cystotomy for drainage	Frequency, straining, and pain, then blood	Ditto.
39	F.	M. 52	Dr. S. Fenwick	Hard epitheliomatous infiltration of walls	Autopsy	Pain and frequency and blood	Ditto.

The two following cases, in which the bladder was probably invaded from the gut, have been omitted from the above list, but retain their numbering for future publication.

5	Mr. P.	M. 45	Dr. de Gruyther and Dr. Carmalt Jones	Carcinoma, posterior wall commencing in gut (?)	Autopsy	Commenced with colic, diarrhoea, and vomiting, then a whistling on micturition, then blood and frequency	Elect. Ill., 2nd ed., p. 185.
25	Mr. S.	M. 60	Dr. Owen-Taylor, of Nottingham	Carcinoma; growth of sigmoid ulcerating into bladder	Laparotomy; colotomy	Attack of intestinal obstruction, relieved by sedatives; <i>feces per urethram</i> ; gas; cystitis	Unpublished

E. *Table of Benign (?) Growths.*

I believe this list to include only benign growths. As, however the microscope is often so hopelessly fallacious in pronouncing upon benignancy and malignancy I do not speak decidedly on any single case. Their clinical, cystoscopic, and microscopic features are in favour of a non-malignant construction.

No.	Initial.	Age.	Medical attendant.	Diagnosis.	Confirmed.	Onset symptoms.	Published.
1	Mrs. C.	60	Dr. Field, of Bath	Sessile hazel-nut sized fibro-papilloma, left ureteral orifice	Removed, living	Thirteen years previously a sudden and causeless hæmaturia; intermittent; symptomless; latterly continuous	Elect. fil., 2nd ed., p. 163.
2	Mrs. W.	64	Dr. Wilson, of Irvine, Ayrshire	Large fibro-papilloma, right side of base	Ditto	Five years' profuse, symptomless, intermittent hæmaturia	Unpublished
3	Mrs. W.	60	Dr. Murphy, of Twickenham	Large, walnut-sized, pedunculated growth, lip of right ureter	Ditto	Two and a half years' causeless hæmaturia intermitted, increased by exertion	Ditto.
4	Mrs. R.	65	Dr. Waterhouse, of West Hampstead	Villous growth, postero-upper wall	Living and well	Eight weeks before cystoscopy saw fresh blood in chamber; symptomless; ceased after cystoscopy	Ditto.
5	Mrs. H.	72	Dr. Blake	Two small cockscomb papillomata, left ureter	Ditto	Gouty irritation, but sudden hæmorrhage a month previous determined the cystoscopy	Ditto.
6	Miss F.	20	Dr. C. W. Fisher, of Sittingbourne	Small hazel-nut sized growth of doubtful character	Refused treatment	At age of 15 fell, and hæmaturia followed. Two other attacks since; symptomless	Ditto.
7	Mrs. L.	71	Dr. Astou Ayres, of Balham	Large villous growth, left lateral wall	Removed, living	Two years' symptomless, causeless hæmaturia	Ditto.
8	Mr. H.	—	Dr. A. E. Kennedy, of Plaistow	Pedicle, large, taggy, villous growth; posterior wall behind left ureteral orifice	Ditto	Hæmaturia commenced gradually, then straining, frequency, and pain; blood worse on exercise, coition	Ditto.
9	Mr. K.	48	E. H. F.	Large fibro-papilloma on left side of bladder	Removed. Died, ? influenza	Painless intermittent hæmaturia for 20 years; pain after 14 years due to plugging of urethral orifice	Ditto.
10	Mr. E.	34	Dr. R. H. Nicholson and Dr. Zimmerman, R.N.	Small, stalked, villous papilloma, left side of bladder	Ditto	Profuse and symptomless hæmaturia	Ditto.
11	Mr. D.	35	Dr. Carline, of Lincoln	Villous tumour, left side of bladder, abutting on orifice	Removed, living	Hæmaturia 20 years previously; recurred after exercise, <i>e.g.</i> after tennis, 3 years ago, then pain in walking and frequency	Ditto.
12	Mr. A.	44	Dr. H. G. Sutton, of Sittingbourne	A (?) pure villous on inter-ureteral bar	Ditto	After much walking one year, previously symptomless, profuse hæmaturia, intermittent	Ditto.
13	Mr. S.	32	E. H. F.	Large villous growth at right side of bladder neck	Removed; recurred; removed again	Causeless hæmaturia, intermittent, then pain before incontinence, due to blockage	Ditto.
14	Mr. R.	32	Dr. Henry Kempster	Polypoid fibro-papilloma on left bladder base	Removed, living	Six months' difficulty in micturition, then blood	Ditto.
15	U.	52	Hospital	Subvillous, left ureter	Ditto	Six weeks' blood-clot size of pea; pains in loins	Ditto.

F. Table of Fifty Cases of Stricture lately treated in the London Hospital.

Initials.	Duration of stricture.	Urine.		Albumen.	Deposit.
		Reaction.	Sp. gr.		
	Years.				
E. M.	12	Acid	1020	Trace	Mucus.
E. C.	14	"	1015	Nil	Nil.
W. G.	12	"	1008	"	"
W. P.	10	"	1020	"	"
W. W.	10	F. acid	1010	Trace	Mucus; pus.
T. G.	11	Neutral	1010	"	Muco-pus.
S. F.	22	Acid	1010	Nil	Pus; urates.
T. W.	10	"	1012	"	Nil.
W. S.	30	"	1011	"	Muco-pus.
C. L.	32	Alkaline	1022	Trace	Phosphates; pus.
J. K.	11	"	1015	$\frac{1}{4}$	Muco-pus.
H. B.	12	Acid	1020	Nil	Nil.
R. J.	15	"	1012	"	"
R. W.	13	"	1015	"	Mucus.
G. L.	25	Alkaline	1021	Trace	Phosphates.
T. C.	12	Acid	1018	"	Little pus.
C. S.	16	Alkaline	1024	$\frac{1}{4}$	Pus; blood; phos- phates.
W. C.	" Some "	Acid	1015	Trace	Pus-cells.
J. J.	14	"	1012	"	Pus and granular casts.
C. B.	16	"	1016	"	Mucus.
J. C.	15	Alkaline	1015	$\frac{1}{10}$	Blood; pus; casts.
W. T.	14	"	1020	$\frac{1}{8}$?
W. D.	30	Acid	1014	Trace	Pus.
W. W.	11	Alkaline	1022	Nil	Mucus.
G. S.	15	Acid	1010	Trace	Pus.
J. H.	29	Neutral	1010	Nil	—
T. A.	20	Acid	1010	"	Nil.
E. S.	12	Alkaline	1028	$\frac{1}{10}$	Pus; mucus.
W. P.	20	Neutral	1012	Trace	Granular casts.
T. C.	20	Alkaline	1020	"	Pus.
J. S.	20	Acid	1003	"	Nil.
F. T.	15	Neutral	1013	Nil	Pus; phosphates.
T. P.	11	Alkaline	1021	Trace	"
J. T.	10	F. alkaline	1010	Nil	Mucus.
J. G.	12	Acid	1015	Trace	"
E. H.	26	Alkaline	1020	Large percentage	"
W. P.	23	Acid	1018	Nil	Nil.
J. P.	20	"	1020	Trace	"
A. G.	15	"	1015	Nil	"
Z. L.	20	"	1015	"	"
A. F.	16	"	1012	Trace	Blood; pus.
J. M.	30	"	1010	Nil	Nil.
J. S.	10	?	1009	$\frac{1}{10}$	Pus.

Initials.	Duration of stricture.	Urine.		Albumen.	Deposit.
		Reaction.	Sp. gr.		
B. H.	Years. 10	Alkaline	1020	Trace	Pus.
W. W.	" Long while "	"	1010	$\frac{1}{10}$	Blood; pus; phos- phates.
J. S.	25	F. acid	1010	Trace	Mucus; phosphates.
J. P.	10	"	1016	"	Pus.
J. E.	" Some time "	Alkaline	1006	$\frac{1}{6}$	"
R. V.	10	"	1020	Trace	"
H. A.	20	Acid	1020	"	Blood and pus.

G. The Condition of the Kidney in the First Twenty Cases of Stricture of the Urethra dying at the London Hospital in 1842, 1843, &c.

Initials.	Age.	Condition of kidney.	Condition of ureter.	Condition of bladder.	Complication.
C. G.	58	" Small "	—	—	Extravasation.
J. P.	50	Very large, and in both many small abscesses	Dilated	Hypertrophied and congested; contained bloody urine	—
W. C.	59	Healthy	—	Hypertrophied	Four years' stricture.
J. G.	37	Wasted, pyelo-nephritis	—	—	Pyæmia.
W. B.	18	Large; small abscesses	Pyelitis	Dilated	False passage.
G. R.	32	Enormous; pyelo-nephritis; great dilatation of pelvis	—	Hypertrophied	Extravasation.
A. R.	65	Dilated	Dilated	"	"
H. P.	45	"	"	"	—
J. K.	43	Large white,	—	"	Extravasation.
H.	?	Enormously dilated	Enormously dilated	"	Death from vomiting.
S. L.	40	Congested, otherwise healthy	—	—	D. T.
J. S.	?	Large, pyelo-nephritis	Dilated	Distended	Retention; perinæal section.
T. J.	50	Small, not very congested	Not dilated	Contracted with blood and extravasated	Suppression.
T. J.	38	Abscesses in kidneys; pelvis dilated	—	Hypertrophied	Abscess of prostate.
C. B.	42	Kidneys larger than natural; acute suppurative nephritis	Not dilated	Dilated and hypertrophied	Extravasation.
J. R.	49	Acute suppurative nephritis	—	Hypertrophied	"
W. G.	53	Granular puckered, cortex wasted	—	"	—
J. P.	54	Acute suppurative nephritis; right pelvis dilated	—	—	Diabetic coma.
G. T.	45	Acute suppurative nephritis; hugely dilated right kidney	—	Hypertrophied	Extravasation.
G. N.	42	Unaffected	—	Dilated	—

H. The Condition of the Kidneys in Twenty Cases of Stricture dying at the London Hospital, 1884—1892.

Year.	Age.	Duration of stricture.	Condition of kidneys, ureters, and bladder.	Complication.
W. S. 1892	37	5 years	Kidneys pale and swollen	Extravasation.
J. R. 1891	59	Some years	Right kidney hypertrophied; granular on surface; a few stones. Left kidney abscess; many stones; granular and contracted	—
W. J. 1891	46	24 years	Suppurative pyelo-nephritis	Extravasation.
S. B. 1891	38	15 years	Suppurative pyelo-nephritis; ureters dilated	„
J. P. 1890	45	28 years	? Acute nephritis; cystitis	Suppression after forcible dilatation.
R. C. 1890	44	4 years	Acute suppurative nephritis grafted on a chronic interstitial nephritis	—
G. M. 1889	40	8 years	Suppurative nephritis and cystitis	—
J. C. 1887	36	4 weeks	Acute pyelitis; bladder contained pus and showed remains of old cystitis; pelvis of kidney and ureters contained pus; abscesses in shoulder-joint	Pyæmia.
C. J. 1887	54	Many years	Chronic interstitial nephritis with commencing suppurative nephritis	Extravasation.
C. G. 1887	49	20 years	Kidney congested; ureters healthy; subacute cystitis	—
J. S. 1886	43	20 years	Acute nephritis; dilated renal pelvis; bladder hypertrophied and dilated	—
W. N. 1886	41	?	Kidneys normal; bladder dilated and hypertrophied	Suppression.
J. G. 1886	65	?	Kidneys and ureters normal; bladder hypertrophied; acute ulcerative cystitis	—
J. C. 1886	40	Some time	Slight fatty changes in kidney; submucous hæmorrhages in bladder.	—
W. R. 1886	48	Many years	Renal cortex contracted; pelves and ureters dilated; heart hypertrophied	—
J. K. 1886	46	—	Renal pelves dilated; cortex thinned; bladder hypertrophied; cystitis	—
E. C. 1885	45	8 months	Kidneys mero bags of pus; all secreting tissue destroyed	—
E. P. 1885	66	15 years ?	Surgical kidneys contracted, and hypertrophied bladder	—
T. S. 1884	46	14 years	Granular atrophy of kidneys	Extravasation.
G. D. 1884	39	2 years	Kidneys normal	—

J. Leiter's Pliable Metal Coils.

These coils, which can be obtained at Krohne and Sesemann, 8, Duke Street, Manchester Square, London, are a great advantage in all cases necessitating the *continuous* application of cold, for when once applied the patient remains undisturbed while their action is continuously going on. The temperature is constant. The use of ice is rendered unnecessary. They are light, cleanly, inexpensive, and easy of application, and being pliable they can be moulded to the part with the greatest ease.

Fig. A shows the coil bandaged on to the loin for a case of ruptured kidney, and Fig. B illustrates its application in the traumatic peritonitis which not unusually complicates such an injury.

One end of the tube is dropped into a pail of water, which is placed above the patient, and the other is placed in another pail beneath the bed.

To set an apparatus in action, it is only necessary, after all its parts have been connected, to establish the syphon action in the ordinary way, by suction of the lower tube; then by regulating the flow by means of the tap a continuous stream passes through the coil.

For hospital or private use Mr. Leiter has constructed a wooden stand, Fig. C, consisting of a wooden upright, on which two wooden trays can be raised or lowered to the required height, as shown in the engraving. I give the illustration not because the stand will be found needful, but because it illustrates the position of the tubes and vessels. When the lower vessel is nearly full the position of the two bottles may be reversed, and by this repeated changing a continuous flow of water through the coil is maintained for any length of time, without even the trouble of changing the water, provided its temperature is not allowed to reach 15° C. (59° F.). The pliable metal tubing being a good conductor, the same cooling effect is produced with water of 10° to 15° C. (50° to 59° F.) as with ice in ice-bags and india-rubber ice-water appliances. If water of 10° C. (50° F.) be used, it produces such an intense cold that no patient can long endure it; if ice-water is used 3° to 4° C. (36° to 39° F.) to an unprotected surface, it produces complete anæsthesia in a very short time.

FIG. A.

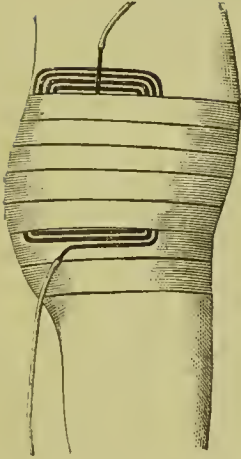


FIG. B.

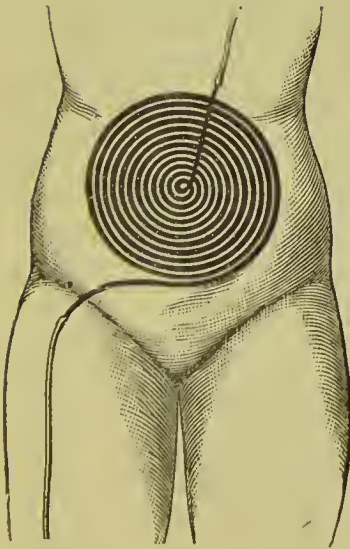
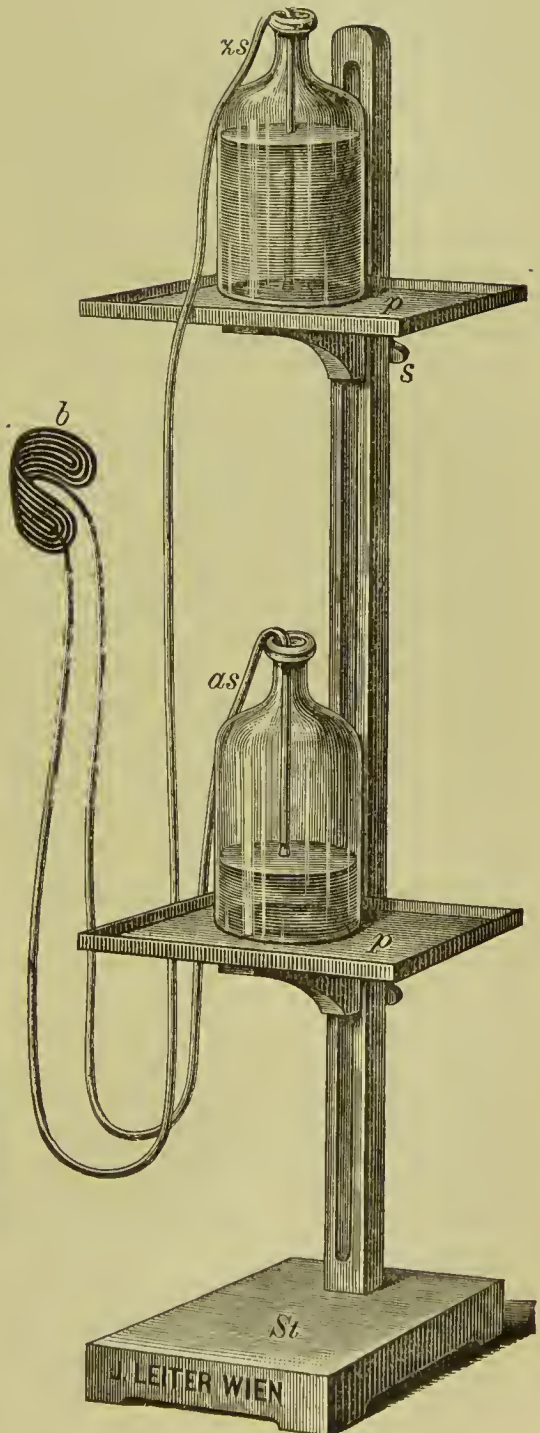


FIG. C.



K. *On the Detection of Ruptured Bladder.**

Weir makes a further contribution to Cabot's well-known method of diagnosing intra-peritoneal rupture of the bladder ('Boston Medical and Surgical Journal,' vol. cxxv, No. 15). Cabot's method consisted in throwing a known quantity of fluid into a previously empty bladder. If this viscus is uninjured, the same quantity should be returned again through the catheter. To be of positive service such a test should, according to Weir, be applied several times, and with a decided amount of distension of the bladder. The author considers that this test may further be improved by combining rectal and vesical distension, with a known quantity of water for the latter viscus. The bladder outlined in this way above the pubes is only to be confounded with extravasation occasioned by the test, and this is controlled by the measurement of the fluid finally emptied from the bladder. If dulness on percussion above the pubes occurs, and the fluid withdrawn from the bladder is lessened in quantity, an extra-peritoneal rupture can be inferred. If no dulness or recognised vesical distension above the pubes takes place, but there is diminution of the injected fluid, intra-peritoneal or sub-peritoneal postero-inferior rupture can be assumed. If the latter exists, a rectal examination made, before and subsequent to trying the test, will show increase in the extravasation in that region, as was proved by the author in a case under his charge. Where the site of rupture cannot be determined with accuracy, supra-pubic incision should be made, when any slight infiltration exterior to the bladder will be revealed. If this incision does not throw light on the case the bladder should be opened sufficiently for digital and ocular inspection.

The difficulties which surround the diagnosis is well illustrated by the following case, reported by Mr. Hulke in the 'Lancet,' July 23rd, 1892, p. 197. In his case "the bloody tinge of the urine raised a strong presumption of injury of the bladder, but the quantity of urine that the bladder apparently held seemed to contra-indicate a complete rent; the early subsidence of the symptoms of great shock and the retardation of symptoms of peritonitis conspired to mislead, and so led to the postponement of laparotomy, which, had the true nature of the accident been immediately perceived,

* 'Therapeutic Gazette,' Jan. 15th, 1892.

would have been undertaken with a reasonable prospect of the patient's recovery.

Extensive laceration of the urinary bladder; laparotomy and suture of rent; death from peritonitis.—C. E—, aged 33, in the evening of January 14th, 1892, in rough horse-play with others with whom he had been drinking, was butted sharply in the abdomen. He at once felt great pain, and he was shortly after this brought to the hospital at 9 p.m. On reception into Founder Ward the house surgeon noticed that he had an anxious expression, coldness of surface, and a small, weak, slow pulse. He complained of severe pain in the lower part of the abdomen, and of an urgent desire to micturate. The front of the abdomen was everywhere resonant. A catheter was passed without difficulty, and some urine (roughly judged by the ward sister to be six or eight ounces) very lightly tinged with blood was drawn off. On withdrawing the catheter a small blood-clot was noticed entangled in its eye. At six o'clock on the following morning, there being again an urgent wish to micturate, the house surgeon again used the catheter, and drew off nearly as much urine as on the preceding evening; it was still slightly blood-tinged. At 10 a.m. the pulse was 126 and the temperature 99.7°. At the midday visit, when he was first seen by Mr. Hulke, the symptoms of great shock had passed off. He complained of some pain over the pubes, where there was found a central dullness suggestive of a full bladder. With a catheter twenty-two ounces of urine, very slightly blood-tinged, were drawn off, after which the dull area was found resonant. When in the bladder the catheter was gently used as a sound for the detection of a rent in the viscus, and with a negative result. The accumulation of so large a quantity of urine apparently in the bladder seemed incompatible with the supposition of a complete rent involving its peritoneal coat and allowing the efflux of urine from the cavity of the bladder into the peritoneal sac; and to justify the diagnosis made by the admitting officer and house surgeon of shock from severe blow on the abdomen, with perhaps bruising and possibly partial laceration of the bladder or a slight laceration of that part of it uncovered by peritoneum, a close watch was kept for any sign of extravasation into the pelvic cellular tissue. In the early evening increased pain in the abdomen and some tenderness and vomiting supervened. This was attributed to the supervention of peritonitis. Small doses of morphia were given hypodermically, and at 12 midnight leeches were put on. This was followed by ease and apparent improvement; he took and retained liquid nourishment.

16th.—10.30 a.m.: temperature 100°; easier. In the evening vomiting returned, and he had more pain in the abdomen, which had become distended; urine drawn off is turbid and offensive; cystitis was present.

17th.—Vomiting; much abdominal pain and great distension. An exploratory laparotomy, which had been considered and previously thought unwarranted, was decided on. The abdomen was opened—after passing the catheter and withdrawing three ounces of offensive bloody urine—by an incision three inches long, just above the pubes and afterwards extended nearly to the umbilicus. A large extravasation of blood in the subperitoneal cellular tissue was found behind the rectus muscle. On dividing the peritoneum several ounces of grumous bloody fluid escaped. At first only coils of highly congested small intestine, coated and agglutinated by recent exudation, were apparent, but on displacing these gently upwards much highly offensive puriform fluid welled up from the situation of the urinary bladder; and when this had been sponged out, a rent, nearly sagittal in direction, about

two inches and a half long in the posterior wall of the bladder, was brought into view. Its edges were swollen, soft, and stained with infiltrated blood. The rent was closed with a double row of closely placed sutures, the deeper series including all the tissues down to the muscle, and the superficial series the peritoneum, with perhaps a thin plane of muscular tissue. The bladder was then injected with a watery solution of boric acid, and proved watertight. The peritoneum was flushed out and cleaned. The abdominal wound was sutured in the usual manner, and the bladder was kept drained by a full-sized soft red rubber catheter. For two hours after the patient was put back in bed vomiting ceased, but it soon returned. The peritonitis ran a rapidly fatal course, and death occurred next morning (the 18th) at 6 o'clock. At the necropsy the sutured rent in the bladder was found still watertight, no leakage occurring under considerable pressure. The pathological appearances observed were those of an intense, widely diffused peritonitis, which had evidently its focus in the vesical injury.

L. *Prout upon Urinary Hysteria in the Female.*

The peculiar aberrations, mental and bodily, involuntary and voluntary, connected with the female character and functions, and generally known under the name of hysteria, are so numerous and varied, so unexpected and improbable, that a volume might be occupied in describing them. We shall confine our attention principally to those affections of an hysteric character more especially involving the urinary organs, which, for reasons sufficiently obvious, are among the most frequent as well as the most important. Perhaps there is not a disease to which the urinary organs are subject that has not its counterpart or similar in hysteria. Innumerable instances have occurred to me, for example, in which calculi have been said to be passed from the kidneys and bladder by hysteric females. Such calculi I have examined, and found them to consist perhaps of a fragment of tile or even of brick—in short, of anything but what is known to be of urinary origin. Moreover, in some of these cases, a train of symptoms resembling those accompanying nephritic attacks have been stated to accompany the descent and exit of the calculus from the kidney and bladder; and so accurately have the symptoms been simulated and described, that neither those who have witnessed them nor those who have heard them described have appeared to doubt the reality of the attack till the pretended calculus has made its appearance, when its chemical properties have at once dispelled the illusion and demonstrated the true nature of the affection. In such cases I have even known the properties of the urine changed (I know not by what means) so as to correspond with the symptoms

described; and there has been blood or mucus or other unnatural matter present in the secretion, as it were at the will of the patient.*

One of the characteristic symptoms of hysteria, as is well known, is diuresis, and on occasions in which this symptom occurs the quantity of limpid urine or of mere water that is passed is sometimes extraordinary. At other times suppression of urine is a (pretended) symptom, and the patient declares that for days together she does not void water. Retention of urine is another occurrence, and the patient either cannot or, as some suppose, will not empty the bladder without mechanical assistance. All these affections, however, are obvious in their nature, compared with those obscure affections of the spinal cord, or column, or joints, &c., which are not unfrequently met with in females, and which appear in many instances to belong to hysteria, or at least to be modified by that affection. Such affections have been described by Sir B. Brodie, and are well known to our most experienced surgeons. Formerly, however, the nature of these affections was entirely overlooked; and even still, perhaps, they have not been so generally studied as they ought to be. The consequence was, perhaps still is, that many a poor girl has been confined on her back for months, or even for years; and for the cure of an imaginary disease, her health and prospects in life have been sacrificed in reality.

In investigating hysteric cases we should constantly remember that the utmost duplicity and cunning may be dis-

* I may mention by way of illustration a striking instance that occurred to me many years ago. The patient was a remarkably sedate individual, between thirty and forty years of age—in short, the last person one would have suspected. She had for years, according to her own account, suffered from nephritic attacks, the symptoms of which she described in all their minutiae with the greatest accuracy. She had never passed calculi, but the attacks above mentioned were attended and followed by large deposits of a white substance in the urine, which was generally alkaliescent and apparently much deranged. This white substance proved on examination to consist chiefly of carbonate of lime, with some phosphate of lime and triple phosphate of magnesia and ammonia. At length circumstances raised a suspicion in the mind of the gentleman who usually attended her, and on closely pressing her and threatening exposure, she confessed that the whole was a deception, and that she had been in the habit of mixing quicklime or chalk in the urine, and thus of producing the appearances above mentioned. I learnt on inquiry that some members of this lady's family were insane. Hysteric females are subject on certain rare occasions to pass urine nearly black, and I have known this appearance kept up artificially for a long time together by the admixture of ink with the urine. I have also occasionally seen hysteric urine not only strongly serous, but otherwise deranged, so as to cause alarm about the state of the kidneys and bladder, yet the whole has after a time disappeared, and the patient has become quite well.

played, where from mere appearances we should expect nothing but the most rigid truth; in short, the whole energies of the patient's mind are bent on deception, and consequently that the deception is likely to be greater and more difficult of detection in proportion as the patient is more highly educated, or has been more frequently seen and examined. Moreover, the sex, the age, the apparent sufferings of the patient, all conspire to interest us in her favour, to warp our judgment, and to unfit us for an impartial inquiry into her case. One of the best modes of proceeding, therefore, at the outset, is to make the patient describe her own feelings in her own words, and if possible in her own handwriting; at any rate, the principal symptoms, as stated by herself, should be written down *before a single question is asked*. Indeed, leading questions in all such cases should be most carefully shunned; for though the symptoms inquired after may not be present at the time, yet the hint will be carefully treasured up in the memory, and the symptom will not fail to appear at some future time. Hence, as just observed, in hysteric affections the symptoms generally become more numerous and urgent in proportion as the patient becomes more knowing. I state this with pain and reluctance; but when we consider that the character of the medical man in attendance, no less than the well-being of the patient, is at stake, it becomes our duty for the sake of both parties to place the matter in a strong light. As to the *motives* of the patient for such deception, that is another question. To become an object of attention—an interesting object—is an innate and characteristic feeling of the female mind; and if in early life this feeling, in its natural and legitimate form, has been thwarted or disappointed, it is almost sure to deviate into some other channel; and the ruling passion is displayed in attempting to excite pity and commiseration where she cannot excite erotic sentiment. This, however, may be said to be a question of morals rather than medicine.

I shall not, therefore, pursue the subject further, but shall merely observe that all the worst cases of hysteric aberration that have fallen under my notice have appeared to be fairly referable to an exalted or modified condition of the above-mentioned innate female feeling—tinctured, perhaps, in some instances, by remote shades of insanity.

*M. Dr. S. Fenwick on the Dietary of Dyspepsia.**Atonic Dyspepsia.*

The symptoms of dyspepsia arise from the amount of the gastric juice secreted being insufficient to dissolve the food introduced into the stomach, so that fermentation takes place in it. The most obvious means, therefore, of counteracting dyspepsia must be to improve the general health of the patient, in order that a larger quantity of the gastric juice may be secreted, only such articles of diet being taken as can be most readily digested. There are certain circumstances connected with the habits of the patient that require careful regulation. It is the general custom to take a certain amount of solid food three times a day, and experience seems to prove that this arrangement is that which is best fitted to maintain the health under the conditions of modern life. The midday meal is, however, often neglected by men engaged in active occupations, and in consequence the stomach becomes fatigued, and is unable to digest at a late hour. On the other hand, some dyspeptics are in the habit of taking food too frequently, so that the organ never obtains sufficient repose. In either case the patient must be reminded that the digestion is certain to be injured, either by lengthened fasts or by a too frequent repetition of the meals. Slow and perfect mastication of the food is equally important, in order that the gastric juice may come into contact with every particle that is swallowed. The process of cooking is intended to soften the food, so that it may be more readily dissolved; and the greatest care must be taken that every article intended for the dyspeptic should be rendered as easy of mastication as possible. The various kinds of animal food differ in the facility with which they are digested, according to the tenderness of their fibres, and the amount of fatty or oily matters they contain. In consequence of this the smaller fish, such as the whiting, sole, plaice, and haddock, are better fitted for the dyspeptic than those that have harder fibres, such as cod, ling, halibut, or turbot. The oily fishes—the salmon, mackerel, eel, and herring—must be avoided. Uncooked oysters generally agree, whilst the harder shell-fish, such as crab, shrimp, and lobster, are difficult of digestion. For the same reasons, the chicken, partridge, pheasant, grouse, young pigeons, and turkey can be readily taken, whilst the goose and duck are apt to give rise to indigestion, on account of the large amount of fat they contain.

The rabbit and hare usually agree. Mutton, if lean, is more digestible than the richer kinds of meat, such as pork and beef; while the flesh of young animals—as, for instance, veal and lamb—is tougher, and therefore less fitted for dyspeptics than the same animals when more mature. Lean tripe and the thymus and pancreas of the calf digest readily; but the heart, liver, and kidneys are unsuited for a feeble digestion.

The fatty kinds of food, although they are not digested by the stomach, are apt to undergo decomposition if they are long retained in this organ. A small quantity of fresh butter or bacon does not generally disagree, but a large amount must be avoided. These usually cause less inconvenience at breakfast than at the later meals.

The saccharine and starchy materials of the food are not acted upon by the gastric juice, consequently they might be expected to be especially fitted for the dietary of a person suffering from dyspepsia. In practice, however, they are found to produce flatulence, so that such articles must be used only in moderate quantities. Rice, semolina, vermicelli, or well-boiled macaroni, generally agree better than arrowroot, sago, or tapioca. Bread should not be eaten when it is new, but when stale, for then it is dry, and therefore more readily acted upon by the secretion of the stomach. Aërated bread, rusks, and toast are well fitted for a weak digestion. The woody parts of vegetables are very insoluble in the gastric juice, consequently these articles of diet differ in digestibility according to the proportion of cellulose they contain. The potato is, therefore, often the only vegetable that will agree; in other cases sea-kale, cauliflower, new green peas, vegetable marrow, French beans, boiled celery, and beetroot can be taken without much difficulty, even when the turnip, carrot, or cabbage will provoke an attack of indigestion. All uncooked vegetables, such as lettuce, radishes, &c., must be avoided.

Raw fruits, with the exception of grapes, rarely agree, but well-cooked apples can be often digested without much difficulty. Dried or preserved fruits, on account of their toughness, and all nuts, from the quantity of oily material they contain, should be rejected. When the patient has been forbidden to indulge in vegetables for a length of time, he should be allowed to take fresh lemon juice, squeezed over his food, in order to prevent any tendency to scurvy. As a general rule, only a small quantity of liquid should be allowed at meals, as a large amount is apt to dilute the gastric juice so greatly as to lessen its action on the food. For the same reason the

patient had better abstain from soup and broth. Effervescing liquids are also to be forbidden, since they are apt to distend the stomach and intestines with gas. Cocoa or weak tea is to be preferred to coffee. In most instances it is advisable for the patient to abstain from alcohol, but where this cannot be done a small quantity of brandy, whiskey, or dry sherry may be taken at meal-time.

Daily exercise in the open air, either by walking or riding, is essential for all persons suffering from a feeble state of the digestion, but it is advisable to avoid exertion immediately before or shortly after a meal. Whenever it is practicable, travelling is invaluable. Sea-bathing in the summer is usually beneficial, and at other times a cold or tepid bath should be used daily, or the skin should be sponged with water containing sea-salt in solution. The clothing ought to be warm, and suited to the climate and state of the weather.

Dyspepsia attended with Excessive Flatulence.

The diet in these case requires to be modified, although the rules already given for improving the general health of the patient must be insisted on.

Only a moderate amount of animal food should be allowed, and the chief meal ought, if possible, to be taken in the middle of the day. Fish, and especially the larger and richer kinds, do not agree as well as chicken and game. Farinaceous food may be taken in moderation, but large quantities should be carefully avoided. This is especially the case as regards bread, an excessive amount of which is often the cause of this form of dyspepsia. Toast, rusks, or biscuits usually agree better than bread made with yeast; whole-meal or brown bread is in most cases injurious. In many instances a charcoal biscuit taken after meals is useful. All vegetables and fruit, either raw or cooked, should be abstained from as long as the symptoms are urgent; but as soon as the digestion improves, trial may be made of well-cooked apples, asparagus, spinach, sea-kale, or boiled celery; potatoes, peas, beans, turnip, carrot, artichoke, and parsnip must be avoided. Liquids should be allowed only in small quantities, and all effervescing drinks must be prohibited. Soup and broth are almost always injurious. Coffee, dandelion coffee, or cocoa made from the nibs is more suitable than tea. Milk may be taken in moderation, but not in large quantities; malt liquors and all wines are apt to produce flatulence, and if a stimulant is

necessary, a small quantity of brandy or whiskey may be taken with the meals.

Dyspepsia attended with Great Acidity.

Most of the cases in which acidity is a prominent symptom are connected with chronic inflammation of the mucous membrane of the stomach.

The saccharine, farinaceous, and fatty materials readily acidify, and should be therefore avoided. Mutton and fowls usually digest more easily than beef, and the patient can often take meat when it is cold better than when it is hot. Veal and lamb not unfrequently agree, but pork, goose, and duck should be forbidden. The richer kinds of fish, such as the turbot and salmon, are unsuitable; oysters are apt to produce acidity, but in some cases the claws of the lobster and crab seem to digest tolerably well. Butter creams and sugar must be prohibited, or used sparingly; bacon generally disagrees. Ordinary yeasted bread is unsuitable, but toast, aerated bread, or rusks may be taken in moderation. The patient should avoid light puddings, pastry, and other articles composed mainly of starch. Well-boiled vegetables, such as cabbage, spinach, sea-kale, &c., may be used, but the potato, turnip, parsnip, and beetroot should be forbidden. Uncooked vegetables sometimes agree, and lettuce not unfrequently relieves heartburn. Grapes, cooked apples or pears in many cases are of use, but other kinds of fruit should not be indulged in. Coffee, cocoa, or tea ought not to be used, but the patient may take a moderate quantity of milk mixed with Vichy water or lime water. Ale and porter are always injurious; it is advisable that alcohol in all forms should be avoided, but where this cannot be done, a small quantity of whiskey mixed with Vichy water may be allowed. A tumblerful of hot water, taken early in the morning, and repeated once or twice a day an hour after meals, often affords considerable relief.

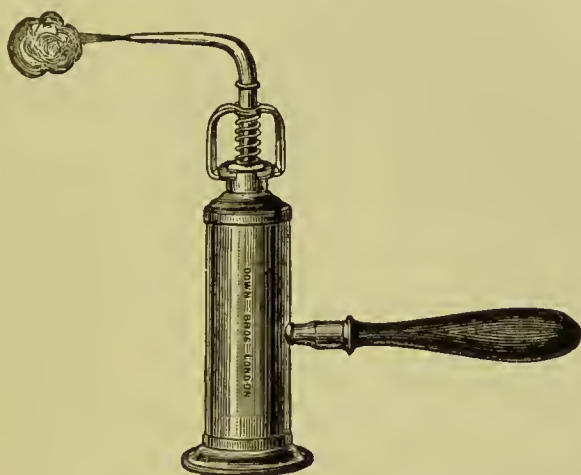
N. *The Sterilisation of Catheters.*

Silver or metal catheters should be made of metal throughout, and after they have been used they should be run through with water and applied to the mouth-piece of a special kettle, or they may be placed in water and boiled.

Soft catheters and gum-elastic catheters can be affixed to the nose-piece of the kettle and hot steam driven through

them. A very convenient little apparatus is made by Down, of the Borough; it is boiled by means of a spirit lamp.

FIG. D.



0.* *Blood Calculi.*

Dr. Scott Alison furnishes the following interesting remarks with reference to a case in which he discovered some blood calculi in the kidney ('Archives of Medicine,' vol. i, p. 245). Upon examining the body of a man named William Solly, who was admitted into the Consumption Hospital, Brompton, under the care of Dr. Cursham, on August 23rd, and who died on the 30th of the same month, the left kidney was found by Dr. Alison to be greatly wasted and changed in structure. The infundibula and pelvis were stuffed with hard bodies, most of which were of a coal-black colour. "The black calculi occupied the pelvis, while the infundibula were tenanted with a few calculi of a whitish-grey colour, with one exception small in size, about the magnitude of pear-seeds, and wanting the ordinary physical character of phosphate of lime." One calculus which occupied an infundibulum is the size of a horse-bean, looks somewhat worn and disintegrated, and at one point resembles a piece of decayed wood. At one side it is black from the presence of altered blood. It is very light in weight, and is composed of blood and phosphate of lime. The black calculi, which formed the chief point of interest in the case, were about six in number, and ranged from the size of a

* From Beale upon 'Urinary Deposits,' p. 408.

coriander seed to that of a small horse-bean. When found these black calculi were tolerably hard, but, being friable, they partly broke asunder in handling.

The fractured surface varied a little in colour, in some parts presenting a dark rusty tint. *Liquor ammoniæ* dissolved them; they were capable of partial combustion. The microscope revealed only amorphous particles, but Dr. Owen Rees, with the assistance of a neutral saline solution, discovered forms which he considered to be the remains of blood-corpuscles. The kidney was remarkably altered. It was very small, but retained somewhat of the normal shape. It weighed only an ounce and a half, and was only two inches in length. Its colour was drab; its consistence was firm and fibrous. At one extremity only could any natural cortical or tubular structure be found. The organ resembled a sac with thin irregular walls. The lining membrane appeared healthy. The renal artery was small, thickened, and scarcely admitted a common probe. The ureter was small, but less out of proportion than the artery. The investing membrane could not be separated from the other parts with which it was connected.

The atrophy of the kidney in this case was probably brought about by the production of inflammatory action, set up perhaps by the presence of small calculi of phosphate of lime. Blood was probably effused in consequence, and, from suppression of urine, remained in the infundibula and pelvis, and failed to be washed down by the ureter. This blood, hardening, would form the calculi which were discovered. After the abatement of the supposed inflammatory action, degenerative processes would supervene, and lead to the remarkable atrophy and change which the kidney presented. The duties of this altered kidney would be thrown upon the other, but as the system was much wasted by disease no increase of size would result.

Only a very imperfect history of the patient could be obtained, he being very exhausted when he came into hospital. Since his death inquiries have been made for information, but with little success. He was fifty-two years old, and by trade a painter. He had been ill with cough two years, and his feet and legs became œdematous only two weeks previous to his decease. No information could be obtained as to his having suffered from calculi in the bladder, or from hæmaturia; but it is right to mention that no member of the family could be found.

P. Cases referring to the Communicability of Phthisis between Man and Wife (from Dr. Heron).

Drysdale ('British Medical Journal,' 1889, No. 1498, p. 604).—A healthy robust man, without hereditary tendency, became consumptive one year after his marriage with a woman who was suffering, at the time of the marriage, from tubercular disease of the lung. This man was the only member of a family of nine who showed symptoms of consumption.

Runeberg (reported in the 'Journal of the American Medical Association,' No. 12, 1889).—A peasant, thirty-nine years of age, of "unstained family history," in excellent health, slept in the same bed with his phthisical wife, and nursed her constantly.

Shortly after her death, he, for the first time, showed symptoms of pulmonary consumption.

Derville (Paris: Steinheil. In the library of the Institute of Hygiene).—A record of cases, and amongst them two observations by Fernet, meant to show that tubercle can be conveyed by sexual intercourse to healthy women. The evidence of the tuberculous nature of the disease in these women was the finding of tubercle bacilli in the vaginal discharge.

Martin ('Revue d'Hygiène de la Police Sanitaire,' No. 8, p. 282, 1886) refers to the work of Vallin concerning the contagiousness of pulmonary phthisis. Eighty-three medical men report 493 cases, of which 213 are attributed to infection. About one half of these relate to the transmission of tubercle between husband and wife.

Megheroff ('Zeitschrift für klin. Med.,' vol. viii) gives tables of forty cases. Twenty-three cases bear on marriage relationships.

'Journal of the American Medical Association,' 1885, vol. v.—Record of cases resembling one another by French authors, *e. g.* Potain, Musgrave-Clay, Bernard, Guérin, Buder, Lamarc, and Bergeret. The last named relates the case of a soldier, healthy, and without hereditary taint, who, having a trivial illness, was sent into hospital. His bed was placed between those of two consumptives, and he also became consumptive. On his return home, his mother, two brothers, his father, a neighbour and his wife, one after another became consumptive.

Wahl ('Deutsch. med. Wochenschrift,' 1885, No. 1, p. 3)

records cases of transmission of tubercle from husband to wife, and *vice versâ*. Amongst these were twenty consumptive married couples. Thirteen of these cases were instances of infection of the wife by the husband (one of the men infected his second wife as well as his first one). In two cases the infection passed from wife to husband.

Debove ('*La Semaine méd.*,' 1883, p. 125) records a case, by Violette, of transmission of consumption by a man to his healthy wife, she having no hereditary taint. This woman's second husband became consumptive. Her niece, who nursed her, also developed that disease, and so did her husband. All these persons are stated to have been free from hereditary taint.

P. Drochen ('*Thèse de Paris*,' 1882) goes to show that consumption may be conveyed by husband to wife. Dr. Herman Weber's cases (nine in number) are quoted, and four similar examples are given by the author taken from his own experience. A very remarkable fact about these cases is, that where the man became a widower and married again he infected his second healthy wife.

Q. *Letter from Dr. Henry H. Mudd in reference to the Cases of Hypertrophy of the Prostate in an Infant and in a Coloured Man aged twenty-seven.*

"ST. LOUIS;
April 6th, 1892.

"E. HURRY FENWICK, ESQ., F.R.C.S.

"My dear Sir,

"I presented at a meeting of the City Hospital Medical Society, held December 3rd, several specimens of hypertrophied prostate, some of which I had removed by prostatectomy in old men. I alluded to a prostatic hypertrophy in a child aged thirteen months and fourteen days. The specimen from the child I was not then and have not been able to find, either in my collection or in the College Museum. It has been misplaced. It was taken from Charles E. Bacon, aged thirteen months, October 5th, 1882, and presented to the eye and to the touch simply the appearance of an hypertrophy of the gland, the two lateral lobes being enlarged, as also the central and median lobe.

"The history of the case recorded in my case book I shall be pleased to furnish you if you are interested in the case without the specimen. The microscopical examination of the

specimen made February 3rd, 1883, by Professor Robert Luedeking, Pathologist in the St. Louis Medical College, was as follows :

"I beg leave to report that I have dissected the congenital tumour involving the urinary bladder that you were kind enough to send me. I find a remarkable enlargement of all the lobes of the prostate gland, the middle lobe projecting into the cavity of the bladder in a manner that Paget describes in the adult. The kidneys exhibit inflammatory induration of the cortical portion. The pelvis and calices of the kidneys were found filled with brick-dust deposits and uric acid infarction. The microscopical study of the enlarged prostate reveals the presence of non-striated muscular fibre to such an extent that the glandular structure has been entirely destroyed. Tingeing with picric acid solution, as well as isolation of the fibres by means of nitric acid and caustic potash, clearly characterise them as smooth muscle-fibres. I would therefore style the tumour 'hyperplastic myoma,' and am of the opinion that this pathological process began and progressed during intra-uterine life."

"CASE 2.—I presented also a large prostatic tumour taken from a man aged 27, whom I saw during life on May 3rd, 1889. There was a large pelvic tumour which seemed to occupy the region of the prostate. Urine was bloody and passed with difficulty or not at all, and the tumour presented well forward so that it could be felt above the pubes, and apparently filled the pelvic basin. The patient was a coloured man, and otherwise perfectly healthy. Was very muscular and well developed. The specimen obtained at autopsy by Dr. Moore of Fayette, Missouri, was examined by Dr. Hartman, who reported it to me as a 'fibro-myoma.'

"A later examination, made since receiving your letter, by Dr. William N. Beggs, reveals, as he claims, the character of the tumour to be a 'sarcoma,' approaching in some parts the appearance of an 'alveolar sarcoma.' This specimen I have at hand, and will take pleasure in sending it to you if you desire it. Please excuse my long delay in answering. I have had thorough search made for the specimen removed from the child aged thirteen months. Please inform me if you would like to have the specimen removed from the coloured man and the history of the two cases. I would send at once the last-named specimen, but I am in doubt whether under the circumstances you desire it.

"Yours truly,

"H. H. MUDD."

R. Mr. F. T. Paul (*British Med. Journal*, January 12th, 1884) on the Classification of the New Growths of the Prostate.

In considering the tumour of the prostate, it has not been unusual to regard it as an organ allied to the uterus, and to point to the similar development of "fibroids" in each. As a matter of fact, however, this hypothetical analogy falls to the ground at once, for these common tumours of the prostate belong to a different period in the functional life of the organ, and have a different structure from those met with in the uterus. The prostate is essentially a secreting gland, and its new growths are allied to those of other secreting glands, perhaps particularly to those of the breast; for the structure of the prostate is extremely like that of the breast in its quiescent condition, except that the fibrous stroma of the latter in it is largely replaced by muscular tissue. But, while the common adeno-fibroma of the breast appears before functional activity, the adeno-myomata of the prostate belong entirely to later life. Hence it is a mistake to suppose there can be any entire analogy between the new growths of two different organs.

Of growths of a simple tissue, myoma is the only one we have met with in the prostate; and for the only example present we are indebted to Mr. Spanton. In his case he removed a mass of the size of a large fist from between the rectum and bladder. The patient subsequently died, and another mass of equal size was found in front of the bladder. It all grew from the prostate, was lobulated and encapsuled, and under the microscope was found to consist entirely of muscular fibres.*

Pure myomata may be more common than here appears, but we believe them to be rare. Adeno-myoma is the common prostatic growth. Since commencing the work we have only examined seven cases, all from my own collection, and in each one a large amount of prostatic glandular tissue was present. These seven include all the ordinary forms of hypertrophy, some involving the whole organ equally, and some forming easily enucleated tumours, usually of the middle lobe. The latter are more glandular than the former,

* This interesting case is reported in the '*Lancet*,' vol. i, 1882, p. 1032. The specimen has been presented by Mr. Spanton to the museum of the Liverpool School of Medicine.

and answer more correctly to the designation of adenoma; while the former, if a line of distinction is to be drawn, must, as at present allowed, be regarded as prostatic hypertrophy. The extremely interesting question of the essential tissue in this compound growth requires a much more extended investigation for its solution. We are inclined to think that in all cases it is the gland-tissue and not the stroma, though it may prove to be the gland-tissue in the case of the encapsuled adenoid tumours, and the stroma in the general hypertrophy.

Sarcoma of the prostate is, probably, the most frequent form of malignant growth to which it is subject. It occurs both early and late in life, mostly the former. We have to acknowledge four cases—two from Dr. S. Coupland, one from Mr. Boyd, and one from myself. We class them as two round-celled sarcomata, one lympho-sarcoma, and one large-celled, spindle-celled sarcoma. One of the cases of round-celled sarcoma was sent to us as a medullary cancer by Dr. S. Coupland; and it is only after careful consideration, and on what we believe to be very just grounds, that we have undertaken to offer a different opinion from one so well qualified to judge correctly; but we are encouraged to adhere to our opinion, especially by the difficulty, which Dr. Coupland freely admits, in arriving at a conclusion. The growth was very rapid, very large, and occurred in a youth aged nineteen—certainly points in favour of sarcoma. Microscopically it consists of rather small irregularly round cells, contained loosely in a wide trabecular framework of connective tissue, the trabeculæ being divided up by capillary vessels, here and there, passing across them; and the cells, adhering to these capillaries, and falling out in the spaces between them, give a false alveolar appearance to the growth, which allows of this difference of opinion. Dr. Coupland's sketch in the 'Pathological Transactions' is perfectly honest, but we interpret its value differently. Mr. Boyd's case is also one of small round-celled sarcoma. Then comes Dr. Coupland's second cases of lymphoma, or, as we call it, lympho-sarcoma. It seems pedantic to be so particular about terms; but, if a classification is to be any good, there must not be two meanings for any designation used. Lymphoma removes the growth, strictly speaking, into a class of its own; while we only consider it as a variety of sarcoma, not more removed from the round-celled variety than is a spindle-celled growth. We quite go with Dr. Coupland in classing together all round-

celled growths having a retiform stroma, but we class them as a variety of sarcoma; and some of the specimens in my own collection, which would ill bear the term of lymphoma, from the size and character of their cells, may yet be very reasonably classed as lympho-sarcoma in the wider meaning of the term. Since examining this specimen I have looked over my sections of normal prostate without being able to find lymphoid tissue in man or monkey; but it is freely present in the prostate of the dog, which is a highly glandular organ, and contains but very little muscular tissue. It is very probable that careful section, in young subjects, will show lymphoid tissue to be normally present in the human prostate. Dr. Coupland has given a very truthful representation of this specimen also in the 'Transactions' of the Pathological Society for 1877. The fourth case is one of my own, and has considerable interest, both on account of the rarity of large-celled spindle-celled sarcomata, and also because it occurred in a man fifty-eight years of age, and gave rise to secondary deposits in the glands and lungs. The growth was extremely soft, and malignant in appearance. Under the microscope the cells were found to be very large and long, and to contain one or two large nuclei, in which the reticulum was particularly plain. The primary and secondary growths had all the same structure.

From such a wide difference in the variety of sarcoma met with in four cases, we should not be at all disposed to exclude any form as being even improbable.

Passing on to the carcinomata of the prostate, we think that they may be pretty distinctly classified as acinous, tubular, and colloid, accordingly as they assume, as in the breast, acinous, duct-like, or colloid characters. We must give up the terms scirrhus and encephaloid. They inevitably bring confusion with them; and, from the histological point of view, if they have any significance whatever, it is frequently a wrong one. Of acinous carcinoma we have four cases—two from Mr. Rushton Parker, one from Dr. Craigmile, and one from my collection. They are all like acinous cancer of the breast—the so-called scirrhus mammæ—and, like it, differ considerably from each other in the size of the cells, and of the groups in which they are arranged. The alveolar stroma also varies in the same way, and is liable to the special distinction of muscular tissue derived from the original prostatic stroma.

Of tubular cancer Mr. Parker sent us one specimen. We do not wish this to be regarded as an absolute variety; for

wherever one draws this distinction, as in cancer of the breast, skin, bladder, liver, &c., a careful examination of different parts of the tumour usually shows the higher evolution at some part. Still, when this is absent, the duct-like columns of cells have a sufficiently striking appearance to claim for the growth a position by itself.

Of colloid cancer of the prostate we have three cases—one from Mr. Boyd, one from Mr. R. Williams,* and one from Dr. F. C. Turner. They are all well-marked examples. Colloid degeneration of cancer depends upon the collection within the cells of the colloid matter. I have now met with a number of cases of colloid cancer. It is far more common than is supposed, and is often passed over by the naked eye when the degeneration is not advanced. In all my cases the primary growth has been in a mucus-secreting epithelium, and I believe that the colloid change bears a distinct relation to this fact. The prostate, as a mucus-secreting gland, therefore, invites this form of growth.

S. "*Caisson*" Working in Bladder Surgery.†

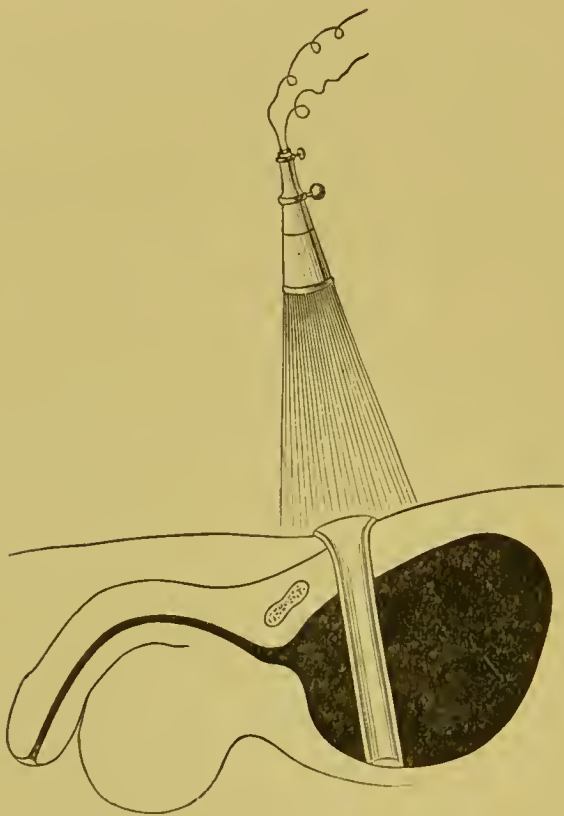
Mr. E. Hurry Fenwick observed that a "caisson" in engineering work was a chamber of iron or wood which was used in the construction of subaqueous foundations, such as those required for the piers of bridges. Caissons, often in the form of enormous hollow cylinders, were sunk over the sites selected for the position of the piers, until they rested upon the river bed, and sank into the softish soil by their own weight, or by ballast pressure. The upper end was above the river level. The water was pumped out until the cylinder was empty, and the excavation could then be proceeded with as if on dry land. The late Mr. McGill, of Leeds, had demonstrated a median lobe of the prostate by means of a speculum, but had not advocated its use in bladder operations. In his first case Mr. Fenwick had used a vulcanite speculum made expressly for him, by Leiter, of Vienna. He passed it through the bladder wound, and sank it on to the spot where he had previously ascertained, by the electric cystoscope, that the tumour was placed. This he did without permitting

* Mr. Williams' section and drawing refer to Mr. Boyd's case from University College Hospital Museum.

† Report of clinical evening, Medical Society of London, 'Brit. Med. Journ.,' p. 1111. Nov. 19th, 1892.

the water in the bladder to escape, as he believed that it would be easier to shift the lower end of the cylinder in water if by chance he had not dropped the cylinder on to the exact spot. The tumour also would be less liable to be scraped by such a movement, and the consequent bleeding would be avoided. By placing a Jacques's catheter into the cylinder when it rested on the bladder, and establishing siphon action by suction from a syringe, the water

FIG. E.



was run out of the caisson, and the tumour could be seen dry and bloodless at the bottom. By throwing in a beam of electric light, by means of Dr. Washington Isaac's incandescent "search lamp," it became possible to remove this growth with forceps with extreme accuracy and thoroughness (Fig. E). In the second case he made use of a Ferguson's speculum. He now employs thin white porcelain cylinders of various lengths and sizes, according to the thickness of the parietes, the depth of the bladder, and the size of the

area to be operated upon, or vulcanite specula if the cautery had to be employed. The bladder incision was made just large enough to admit the cylinder. Rectal bags were not used, but the patient was nearly always placed in the "Trendelenburg position." The method had proved of especial value in the very earliest stages of benign tumours, *where the growth was very small*; also in removing small sessile, secondary splashes of villous growth which were so often left behind untouched or unrecognised by the finger after the main piece of the tumour had been wrenched or scraped off. If vesical growth was operated upon earlier (and by this method statistics of recurrence would be less humiliating) the mortality of the actual operation would diminish, and even in epitheliomatous degeneration of the mucous membrane a cure might in some instances ensue. This belief was based upon an experience of over 100 cases of tumour of the bladder. The method could be used in bladder growth for curetting or cauterising definite catarrhal or tuberculous ulcerations, for incising the mouths of sacs of encysted stones, and for marking out the lines of enucleation of the intra-vesical outgrowth of the senile enlarged prostate. *It was unfit for contracted bladders* or for very large or extensive growths. It was recommended upon the following grounds:

1. Only a small incision was necessary.
2. The continual passage of fingers, forceps, curettes, and sponges through the wound and bladder incision was unnecessary, for the caisson once introduced was not removed until the stitches had to be inserted. All bruising and tearing of the bladder incision by these manipulations was thus avoided, and if cystitis was present, all chance of fouling of the perivesical tissue was minimised.
3. The growth, the whole growth, and nothing but the growth would be removed.
4. The smallest patches of primary or secondary growth could be seen and accurately treated, the caisson being shifted from place to place.
5. The base of the growth could be cauterised by means of a galvano-cautery porcelain point with safety and certainty.
6. Bleeding could easily be arrested before the patient left the table.

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